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TELEPHONE ENGINEER

MANAGEMENT · ENGINEERING · MAINTENANCE

Vol. 43, No. 9 **September, 1939**

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Published Monthly by

Telephone Engineer Publishing Company

A Magazine devoted to the interests of the entire telephone industry—operating men and manufacturers.

SERVING THE FIVE BILLION DOLLAR TELEPHONE INDUSTRY

Founded in 1909

Office of Publication, Pontiac, Illinois. Executive and Editorial Offices 7720 Sheridan Road, Chicago, Illinois. Phone Rogers Park 3840. J. A. SMITH, President and Treasurer; RAY W. SMITH, Vice-President and Editor: L. M. BERRY ,Vice-President; D. WEINER, Secretary Subscriptions: U. S., Cuba, Mexico, $1.00 Per Year; Canada, $1.50: In all Other Countries, $3.00. Single Copies, U. S. A., 15 cents. All Subscriptions should be sent DIRECT to 7720 Sheridan Road.

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SEPTEMBER, 1939

"Tapping In" On Washington

By ROLAND C. DAVIES
Editor
Telecommunications Reports

LITTLE, if any, interference with the operations of the international communications services of American companies—radiotelephone, cable and radiotelegraph—is anticipated in the neutrality policies of the Government in the present European war crisis. During the early stages, the neutrality program calls for reliance, in the main, upon the communications companies' management and operating executives to prevent traffic to the belligerent nations in Europe which would be violative of neutrality or would contain any espionage information.

Later it may be necessary to promulgate neutrality provisions governing communications which might call for closer governmental supervision if conditions force such steps. But under the present situation the American governmental authorities, charged with the observation of communications, have proposed, it is understood, to President Roosevelt a policy of neutrality for the overseas communications services which are in the nature of general guiding instructions that can be followed by the companies. There is no disposition at the outset to assign governmental officials to posts of supervision over the radiotelephones, cables and radiotelegraph traffic operations, but it is anticipated by the Washington authorities that a close liaison will be maintained by the communications companies and the government departments, directing the neutrality program in this field. This is understood to be particularly planned in the relationship with the Federal Bureau of Investigation of the Justice Department which has charge of preventing espionage activities in the United States.

Because telephone conversations are much more difficult to control than the written cable and radiotelegraph communications, the European war crisis produced the first rigid restrictions on the radiotelephone services of the American Telephone and Telegraph Co. to England and to France—the two European direct circuits by radiotelephone. First France and then Great Britian imposed the restriction, which confined the use of the radiotelephone to official or diplomatic conversations and "official banking" calls. England, too, just before the German invasion of Poland suspended all telephonic communication between the United States and the European continent, as such traffic is relayed via London. The restriction to diplomatic and official banking traffic was also extended to British possessions with which the A. T. & T. operates direct radiotelephone circuits.

WHAT the future holds for the telephone industry in this country due to the war situation is problematical as far as forecasting what situations and steps may develop. Some observers feel that the possibility of business betterment due to demands on American industries from the European nations will cause some expansion in telephone usage and service needs. This factor, together with national defense preparedness planning, may necessitate increased plant construction. Because inflation is a spectre in connection with any war, the construction programming of the telephone industry, it is thought in some circles, should be considered in the early stages of any war crisis so the industry could take advantage of the lower level of costs of such projects.

In national defense preparedness for a war emergency, the telephone industry has a most important spokesman, high in the councils of the American Government, in the presence of President Walter S. Gifford of the American Telephone and Telegraph Company as a member of the new War Resources Board which is charged with the perfecting of the industrial mobilization plans for the United States. Mr. Gifford who served as director of the council of National Defense in the World War is considered to be a most important member of the new agency which is composed of five other outstanding leaders of industry, science and economics. With Mr. Gifford in such a major capacity in the Government's defense preparations, the program for the telephone industry in event of United States participation in a war will be mapped out with the greatest efficiency for complete national and public service.

New FCC Chairman Takes Office

THE fourth chairman of the FCC in the five years of its existence. James Lawrence Fly, former TVA General Counsel, took over the post at the beginning of September, succeeding Chairman Frank R. McNinch who is retiring because of ill health. It was significant that at the oath-taking Benjamin V. Cohen, close New Deal advisor of the President, attended the ceremony and it was thought his presence was an indication to the other members of the Commission that the new chairman would be closely linked with the White House in the future policies of the FCC.

Chairman Fly stressed in a conference with newspapermen that he would proceed cautiously and with close study any formulation of FCC regulatory policies in regard to communications and broadcasting and that he would work co-operatively with the other members of the Commission on these issues.

From the standpoint of the telephone industry, the most immediate FCC proceeding of interest is the September 18 hearing to determine the Commission's jurisdiction over telephone rates where exchange areas extend over state lines. This proceeding has been instituted by the FCC in connection with the Kansas City exchange area rates of the Southwestern Bell Telephone Co., where the interzone exchange rates prevail in the two Kansas Cities in Kansas and Missouri. The Kansas and Missouri state commissions have been asked by the FCC to participate in the hearing which will be along legal lines to go into the authority of the Federal agency over interstate exchange rates. The Southwestern Bell cancelled FCC tariffs which contained previous interstate toll rates when it established the extended exchange area in the cities but did not file the new exchange interzone rates.

The FCC is also embarking on the preliminary planning of its investigation of the interstate toll rates on the Pacific Coast of the Pacific Telephone and Telegraph Co. and its subsidiaries, the Southern California Telephone Co. and the Bell Telephone Co. of Nevada. The groundwork studies in this rate inquiry are being conducted by FCC staff experts on special duty in the Pacific Coast states. The investigation into the Pacific Coast rates was launched after the State of Washington department of public service transmitted a complaint about these long distance charges in regard to their state to the FCC. So far, no plans have been formulated for hearings in connection with this rate probe.

FLASH!

National Convention to Present Noted Speakers

WORD from the office of Louis Pitcher, executive vice-president of the United States Independent Telephone Association, informs us that those attending the Annual Convention in Chicago, on Oct. 10, 11, 12 and 13, will hear one of the most imposing arrays of speaking talent presented by the Association in recent years. The program is taking shape rapidly with Dr. Friday and Congressman Gore of Tennessee who have already accepted invitations to speak. The complete program will be carried in the October Convention Number of TELEPHONE ENGINEER that will reach you before you leave for the meeting at the Stevens Hotel, Chicago.

The Independent Pioneers will have a more prominent section in the convention this year and have already contracted for a prominent speaker that has a reputation several yards long. Their annual banquet and dance will be the feature entertainment as it has been for many years. The committee in charge of the Pioneers Banquet comprises executives of the most prominent manufacturers in the industry and should surpass all other efforts of former years.

From a business standpoint the October meeting will be all important. President B. L. Fisher will report on the Association year which has been possibly more active during the past year than ever before. There will be many attending who are coming for the first time. The result of the Association in their Wage-Hour fight for the smaller companies has welded the industry closer than ever before and should result in many new members among the smaller companies.

The Manufacturers and Suppliers will present the largest exhibit ever before shown at the National Convention. Exhibit Rooms are at a premium with more reservations still coming in. New products and improvements on those you are familiar with will be shown and should, in itself, be ample reason for YOU to attend.

An important telephone development at the FCC during August was the filing of new tariffs for its private line services by the American Telephone and Telegraph Company long lines department will produce a reduction in the services' rate of $1,060,000 per year. The new rates for the leased wire services became effective September 16. The reduced charges will benefit between 700 and 800 users, manly banks, brokers and other financial concerns and includes a reduction of approximately 35 per cent in the charges for the use of teletypewriter equipment.

droaint70s.pfib

State Commissioners Study Telephone Regulation, Depreciation, Securities Bids

THE FCC Telephone Investigation Report, the Kansas City exchange area jurisdictional question and general problems of the telephone industry and rates were considered at the annual meeting of the National Association of Railroad and Utilities Commissioners in Seattle during the latter part of August.

The need for further FCC power to regulate the telephone manufacturing industry, which was recommended in the Investigation Report to Congress, was cited by Commissioner Paul A. Walker in extemporaneous discussions at the state commissioners' sessions. Commissioner Walker cited that he had previously viewed the independent manufacturing industry had presented enough competition to Western Electric to afford a fair basis for price comparisons, but the Investigation had brought out the dominance of Western Electric so he took a position that greater regulatory observation of the Bell System manufacturing branch should be maintained. Commissioner Walker also expressed the view that long distance telephone rates could be lowered some more because of the increase in traffic resulting from such reductions.

A spokesman for the state commissions, Missouri Commissioner James noted that telephone rates at present were as high as they should be and any further increases would tend to diminish telephone usage. He agreed that competition from independent telephone manufacturing companies was a good thing for the industry to prevent stagnation of telephone development. Commissioner James brought out the idea that some thought should be given to the consolidation of small independent telephone companies to make them stronger and noted that the Wage-Hour problems in small exchanges was of great importance and likely to cause many of them to turn to dial automatic service.

The Association's depreciation committee presented a most interesting report

(Please turn to page 33)

Proper Maintenance and Care of Switchboard Cords

Operators should be trained to handle cords properly to insure their long and trouble free life.

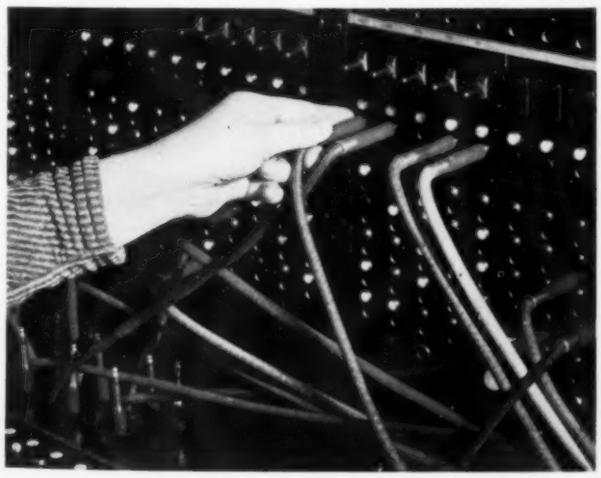
By RAY BLAIN

THERE is no doubt but that switchboard cords, when not properly maintained, cause more trouble than any one item of equipment on a manual telephone system. One defective cord, if permitted to remain in service for any length of time, may cause trouble to be reported on several telephones. When a subscriber experiences noise or cut-out trouble on a connection he usually thinks the defect is in his own instrument and reports it. Even though the majority of these reports may test clear, they do represent money lost in the time of employees and tend to make dissatisfied subscribers. We firmly believe that proper care and maintenance of switchboard cords will reduce trouble on any manual system more than any other one operation which could be observed.

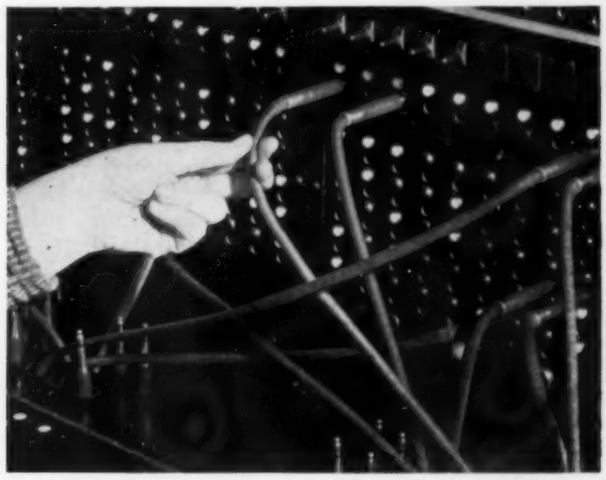
Proper care of cords as herein referred to means their correct handling by the operators. Careless operators may not only shorten the life of cords considerably, but also be the cause of numerous trouble reports. We all realize that it is most difficult for an operator to exercise care in cord handling when she is extremely busy, although with proper training this is not impossible. Operators should be instructed to grasp the plug firmly by the sleeve and insert it carefully in the jack. When taking down a connection, the plug should be grasped in like manner and not flipped out by pulling on the cord itself which speeds the destruction of both the cord and plug. Some operators will insert a plug and then strike it with the palm of the hand. This also shortens the life of good cords.

Some chief operators insist that the operators set the plugs down in the plug seats instead of dropping them although this takes considerable time and is not always observed on busy switchboards. The reinforced section of cords tend to guide them into the plug seat though the plug may swing striking the lamp and jack equipment, injuring one or both. Operators should be trained to handle cords with a steady rhythm and not be jerky in their movements. Chipped opals or marred face equipment on a switchboard is usually an indication of careless cord handling by the operators. A small blow on the tip of a switchboard plug will often bend it or damage the delicate insulating bushings, making its replacement necessary.

ANOTHER reason why operators should handle the cords by the plugs is that the absorption of perspiration quickly deteoriates the textile covering of the cords. The hands of the operators should contact the cords as little as possible. Some telephone companies dip the ends of the cords, that is, the reinforced section, in hot beeswax which tends to make them moisture-proof and less liable to damage from perspiration from the hands of operators. One fault of the wax is that it tends to make the cords stiff



Correct method of cord handling operator grasps plug firmly to insert or take down.



Wrong method of cord handling—operator flips plug from jack by pulling on cord.

and difficult to handle. This fault may be eliminated to some extent by boiling the reinforced sections of cords in a mixture of equal parts beeswax and paraffin. Some also use a mixture of beeswax and petrolatum for this purpose.

Another common cause of switchboard cord trouble is defective plug seats. When plug seats are used until the edges become worn, they often cause the textile threads of the outer covering to become frayed. Plug seats should not be permitted to wear to such an extent that plugs have a tendency to stick in them when falling back by their own weight. Plug seats may be inspected by taking the plug by the tip, pressing it firmly against the seat and at the same time rotating the top slightly. All plug seats found in which the plugs have a tendency to stick should be instantly replaced as the edges have probably worn sharp and will cause damage to the cords. The replacement of plug seats is usually a rather difficult task though it should never be neglected when actually necessary.

The normal wear of switchboard cords generally occurs from bending in the rear of the plug. This constant bending will, in time, cause the outer braid to break and the cord to become noisy. When this occurs, the cord should be repaired by being rebutted or, as some say, cut back. There are several methods whereby this may be accomplished and no effort will be made to describe them here as most telephone men are familiar with at least one satisfactory method. Ordinarily, the tinsel conductors are pierced and the screws placed through the hole for binding to the terminal. This makes a good job although many now prefer the terminal which is pressed direct on to the end of the tinsel conductor. These terminals may be installed with a pair of special pliers or a cranking tool which grips the conductor and the tip in a special die. The latter tool does not require removal of the insulation from the conductors as a tooth arrangement of the clip pierces the insulation and contacts the tinsel conductors. This tool makes easy work of all cord repair.

NUMEROUS arrangements have been devised for cord testing to determine when they should be replaced. While these methods may all be considered good, we believe that a safe method in a medium or small exchange is to repair all cords when the outer braid becomes ragged and worn near the plug. Naturally, all cords known to be defective should be repaired or replaced regardless of whether they indicate wear or not. On a small system, it is considered a very good practice to look over the switchboard each morning and repair the few cords which indicate wear. This will be found much easier than when they are permitted to accumulate. Likewise, they will not cause any appreciable amount of trouble on the system when repaired in this manner. On larger systems, the night switchboard man ordinarily repairs all cords when the board is not busy. It is a matter of choice as to whether cords are repaired on the board or removed and repaired at a bench. Repairs on the switchboard naturally require less time. A cord table on wheels, with necessary tools mounted on it, proves a real convenience when cords are repaired at the switchboard.

Worn or defective plugs should also be removed from service promptly or they will likewise cause serious trouble. Plugs should be replaced if they are bent so as to be readily apparent to the eye or when any of the hard rubber bushings are so cracked or broken as to obviously cause trouble. Also, if the dead collar between the tip and the ring is so loose that it may be pushed out of place to one side. The cord terminal screws should have good threads and have sufficient binding power to hold the cord terminals in firm contact with the plug. Defective terminal screws should be replaced when the plug is not otherwise defective.

Worn, under gauge, switchboard plugs always cause serious trouble as they do not make firm contact with the jack springs. Plugs should be measured at regular intervals with special gauges obtained from their manufacturer. Replace all plugs when the tip, dead collar, or sleeve enters the respective slots of the gauge. Turn the plug slowly on the slot while gauging, using but slight pressure. Plugs are all expensive and many hesitate to throw them away for being under gauge, but to continue their use in this condition will prove an even greater expense.

The tarnish or oxide which forms on brass switchboard plugs is caused by various gases in the air and perspiration from the hands of operators. This condition is generally more serious in summer months and also in certain sec-

(Please turn to page 38)

New Executive Vice-President of Kellogg Company

ANNOUNCEMENT of the elevation of H. E. Billington as executive vice-president of the Kellogg Switchboard & Supply Company on August 15 will prove a very popular one to the telephone industry. The action of the board of directors of the Kellogg Company is a recognition of the organizing ability and constructive work of the former vice-president in charge of sales to which he was elected in March of 1937. He has directed sales of the company since 1927.

H. E. Billington

The mounting importance of sales both from an operating standpoint of the telephone companies and from the manufacturing viewpoint has made it necessary during the past few years that manufacturing, engineering and sales be more closely coordinated to better serve the industry. Mr. Billington with his years of experience in the durable goods industry supplemented with his 17 years in serving the telephone industry was a logical choice to serve in this capacity.

Through personal studies of operating mens' problems, Mr. Billington has been instrumental in many new developments and new designs in equipment to better serve customers who naturally discussed problems with salesmen of the sales department. Through organization, he has been able to coordinate these suggestions until now each department is operating in complete harmony with one another with the resultant advantage to operating men in the entire industry.

A Ready-To-Run Sales Contest, by Zenn Kaufman, Author of "How to Run Better Sales Contest"

HERE'S a contest theme that taps a new interest—bringing the thrill of the poker game into selling.

List your men in one column, on the left. Buy a few hundred small poker chips and paste them alongside of each man's name at the rate of one chip for each 10% of quota. Use White chips up to 50%. Red Chips from 60% to 100% and Blue chips over 100%. The big idea is to get into the Blue chip class—because Blue chips are counted towards prizes. An alternate scoring plan would be to award chips on the basis of each order or each item: or per $100 in business on certain lines. Or a combination of above.

Now for the real fun. Buy a few decks of cards, and award a card (picked blind) for each 5% of quota. You'll find that the men will begin to make side bets on high cards—and soon a friendly competition will develop to see who can build the best poker hand. We suggest that each man be required to sign his cards as he gets them—in order to be certain that there is no trading of cards.

At this point I want to answer a number of inquiries concerning the legal aspects of offering a prize on some basis involving chance. Aside from a few scattered lottery laws which may or may not prevail in your community, the only limitation is one of the U. S. Post Office Department, which under Section 473 of the Postal Law says:

"No letter, package, postal card or circular concerning any lottery, gift enterprise or similar scheme offering prizes dependent in whole or in part upon lot or chance—and no newspaper, circular, pamphlet or publication of any kind containing any advertisement of any lottery, gift enterprise, or scheme of any kind offering prizes dependent in whole or in part upon lot or chance, or containing any list of prizes drawn or awarded by means of any such lottery, gift enterprise or schemes . . . shall be deposited in or carried by the mails of the United States."

PERCENT OF QUOTA

	50%					100%					
Jones	O	O	O	O	O						
Black	O	O	O	O	O	O	O	O	O	O	O
Smith	O	O	O	O	O	O	O	O	O		
Roberts	O	O	O	O	O	O	O				
Turner	O	O	O	O	O	O	O	O	O	O	

FREE Just send us a self-addressed stamped envelope and we'll send you a copy of the SALES CONTEST CHECK LIST—It should guarantee the success of your next sales contest.

Editorial

An Open Letter to Independent Telephony

Since August of 1938 (prior to the enforcement of the Wage-Hour Law) you have read in this publication the complete story of the enactment, the enforcement and the amendment of the Wage-Hour Law. The story in retrospect is that of a crisis, its challenge to an industry, and that industry's battle for its rights. It is not so romantic to mention that this successful battle cost much time and money.

It is the desire of the editor of TELEPHONE ENGINEER to address those Independent telephone companies who are non-members of either the National or State Associations. Possibly in no other industry is there an Association that battles as relentlessly for their smaller members as does the United States Independent Telephone Association, and the affiliated State Associations. The victorious battle just won for the smaller exchanges was won by the National Association with the assistance of the State Associations through the efforts of officials and the Wage-Hour Committee. It has resulted in welding the industry closer than ever before in history.

We are sorry, however, that all Independent telephone companies have not heretofore joined any Association, National or State, altho in cases of stress such as the crisis just faced, they benefited and in a number of cases appealed to the Association to help them. To these companies our National Association has just demonstrated how a unified industry can meet a crisis with a united front composed of officers and directors that succeeded in the Wage-Hour fight when other Associations with many thousands of members failed. They found the smaller exchanges needed relief and they got it for them!

There will be other battles in the future. Your State and National Association needs your assistance, both financially and actually that they might successfully serve you. It is no more than right for us to point out that non-members of the Association are now "on the Spot" and suggest they join the Association and, if possible, attend the National Convention in Chicago on October 10, 11, 12, and 13.

Short Course in Telephone Transmission

By
B. C. BURDEN

PART VI

Necessity for Loading

WHEN we speak of *loading* a telephone cable or a buried wire circuit, we mean the insertion of small inductance coils in the circuits at periodic intervals along the line. The purpose is of course to reduce the overall loss or attenuation which is inherent to any telephone circuit.

With the types and lengths of open wire and cable ordinarily used in small telephone plants there is no necessity for loading, as satisfactory subscriber to subscriber transmission can be obtained over the usual non-loaded facilities.

In the larger plants where long cables must necessarily be used, either between central offices in the same city, or to serve outlying areas several miles from the office, the cable must be loaded to reduce its attenuation to a value which will permit satisfactory subscriber to subscriber communication. For the same reasons long distance toll cables need to be loaded but they require also the use of repeaters.

Some years ago, prior to the development of a successful repeater many long distance open wire copper circuits were loaded, as it was only by the use of large gauge copper (.165) and loading coils that successful communication could be carried on over substantial distances. With the development of the modern repeater the use of load coils on open wire circuits was discontinued and their use confined to cable circuits and to the exchange buried wire.

Theory of Loading

It is a basic rule in the transmission of power that if line losses are to be kept low then the power should be transmitted at high voltage and low current. This is understandable as basic electrical equations state that power is equal to "current squared times resistance." Therefore if we keep the current small we reduce the power loss but at the same time are able to transmit the desired quantity of power over the line.

In the power field this basic rule for the transmission of power is met by using transformers to step up the generated voltage before applying it to the transmission line. The transformer does not change the amount of power applied to the line but it does elevate the voltage and reduce the current thereby reducing the line losses. At the receiving end of the line similar transformers are used to step down the voltage and increase the current thus putting the power back into a form where it can be utilized at the customers premises.

It would seem that this same method could be applied to the telephone problem There is however, this basic difference between the telephone and power transmission lines. The power line is *electrically short* for the frequencies involved, whereas the telephone line is *electrically long*. Practically this means that the sending and receiving apparatus connected to a telephone line cannot influence the behavior of the line in the same manner that terminal equipment does on a power line. Therefore it is not practicable to use transformers to solve the telephone transmission problem. The equation for attenuation on a cable circuit is given by the formula which follows:

$$\alpha = \sqrt{\tfrac{1}{2}(6.28fc)\left[\sqrt{r^2+(6.28fl)^2}-6.28fl\right]}$$

show that the line losses and attenuation can be reduced by reducing either the resistance or the capacitance. Due to

An examination of this formula will the high cost of cable conductors larger than 19 gauge it is generally not practicable to obtain improved transmission characteristics by reducing resistance by the use of larger gauge conductors. Likewise the capacity can be reduced only by a greater separation between wires or the use of improved dielectric material and here again it is impracticable to reduce attenuation by this means.

A further study of the formula, however, indicates that by an increase in the inductance (l) some reduction in attenuation can be accomplished. The improved results that can be obtained by this means however is dependent upon the resistance present in the circuit. For the resistance normally encountered in 19 and 22 gauge cables the application of inductance coils to increase the inductance of the cable pairs does effect a substantial improvement and this is the basis on which loading operates. Theoretically the inductance should be distributed uniformly throughout the cable circuit although this is impracticable because of cost (except in submarine cables). Hence, the loading coil inductance is applied at periodic intervals along the cable pairs. With the coils placed sufficiently close together the results are comparable with what might be expected with uniformly distributed inductance.

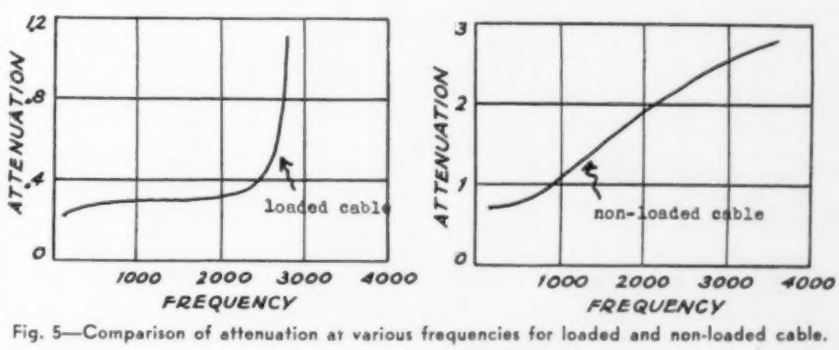


Fig. 5—Comparison of attenuation at various frequencies for loaded and non-loaded cable.

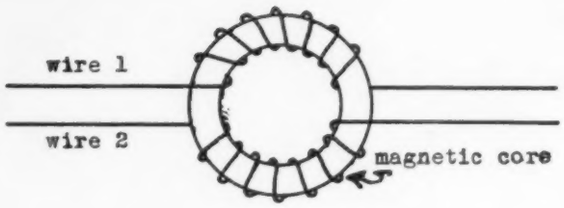


Fig. 6—Side circuit or non-phantom loading coil.

THE practical effect of the loading is to increase the impedance of the cable pair and as a result of this increased impedance it is possible to transmit at a higher voltage and a lower current thus reducing the energy losses that take place as the telephone voice wave travels along the cable pairs. A mechanical analogy that is often used to illustrate the beneficial effect obtained from loading telephone circuits is shown in Figure 4. In this figure a man is shaking a light string up and down so as to produce a periodic wave movement which travels from his hand toward the distant wall. With a light string the wave motion is quickly "damped" and there is very little energy left in the transmitted wave at the receiving end of the string. If however, small lead pellets are periodically distributed along the string so as to give it inertia then the wave will not die out so rapidly and a larger amount of energy will reach the receiving end of the string.

The Critical Frequency of Loading Systems

The application of a loading system to a telephone circuit limits the band of frequencies which can be passed over the circuit. Every loading system has what is termed a *cut off* or *critical frequency*. The *critical frequency* represents the upper limit of frequencies which can be passed by the loaded circuit without excessive attenuation. Beyond this frequency the attenuation increases rapidly and the loading systems act almost like a low pass filter, that is, passes frequencies below the critical frequency. The critical frequency of any loading systems depends on the spacing and the magnitude of inductance of the load coils used. For long spacing and high inductance values the critical frequency is quite low being in some instances as low as 2100 cycles. For short spacing and light loading the critical frequency is raised to as high as 6000 cycles.

Telephone circuits which are used only for normal telephone conversations and not for the transmission of high quality radio programs work satisfactory on rather low critical frequencies. Program circuits which are in use across the country by radio systems must necessarily offer high quality. This is accomplished by loading systems which have a high critical frequency. Within the band of frequencies by which the loading system is designed to transmit there is less distortion in a loaded cable circuit than in an unloaded circuit. This is shown by the curve in Figure 5 which shows a non loaded 19 ga. cable pair and a loaded cable pair. A study of this picture will reveal that the loaded pair cuts off sharply approximately 2700 cycles, whereas the non loaded pair has only a gradual increase in attenuation from 500 cycles up.

Wave Velocity in Loaded Cable Circuits

ONE effect which should be mentioned in connection with the loading of cable circuits is the slowing down of the transmitted wave which results from the insertion of the inductance in the circuit. A 19 gauge non-loaded cable circuit has a velocity of approximately 40,000 miles per second, that is, the wave which travels over a circuit of this type is slowed down from 186,000 miles per second, which is the normal speed at which electricity moves, to 40,000 miles miles per second. When the 19 gauge cable pair is loaded with fairly heavy loading the wave will be slowed to as low as 9800 miles per second. This low

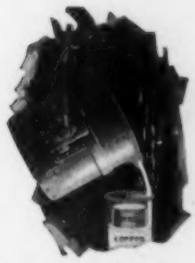
(Please turn to page 36)

Visit of distinguished Portuguese Editors to the Company's Strowger Works, Liverpool. The visitors watched with absorbed interest the dextrous fingers of the employees in the Switch Assembly Shop.

A party of fifteen distinguished representatives of the Portuguese Press visiting under the auspices of the British Council, were the guests in Liverpool of Automatic Telephone & Electric Co., Ltd., on Thursday, July 20th and Friday, July 21st.

The party, under the leadership of Senhor Silva Dias and accompanied by Mr. Cosmo Russell of the British Council, Mr. Marcus Cheke, British Press Attache in Lisbon and Mr. Gordon Forbes, Secretary of the Anglo-Portuguese Society flew from London on Thursday afternoon. They were met at Liverpool Airport by the Portuguese Counsel, Senhor Felix B. M. da Horta, Mr. Arthur H. W. King, C.B.E., British Consul in Lisbon who is temporarily in England, and representatives of Automatic Telephone & Electric Co., Ltd., consisting of Mr. T. A. Eades, Managing Director, Mr. A. F. Bennett, Manager, and Mr. Wrighton, Vice-manager.

On Friday morning the party visited the Strowger Works of Automatic Telephone & Electric Co., Ltd., where they were interested to see automatic telephone exchange equipment in course of manufacture for use in their native country, the Company having now commenced manufacture of equipment under a long-term contract for the Portuguese Government. The visitors were particularly impressed with the airy spaciousness of the different workshops and the bright appearance of the workers. Senhor Silva Dias, in expressing the thanks of the visitors for their tour, said that the spirit and atmosphere of Strowger Works could only be described by the French idiom "something which sings".



Casting molten copper around a white hot steel billet in the Copperweld molten welding process.

The Development of Copper Covered Steel Wires

We are reproducing herewith the history of a process of much importance to the telephone industry. The editor wishes to give credit to the numerous sources of information which made it possible to present this treatise.

FROM early times down to the present day, the desirability of combining the strength of iron or steel with the non-corrosive properties of copper has been appreciated. Primitive people probably realized the advantages obtainable by combining these two metals, since tools and weapons found in the ruins of ancient Assyrian cities, and among the remains of the Swiss Lake dwellers reveal the use of articles with an iron core and a copper alloy (bronze) covering.

Scientific literature and patent records of the 19th and 20th centuries record a constant effort to combine steel and copper to utilize the desirable properties of both. Probably the earliest patent on a process to accomplish this combination in a single product was issued in 1821 to Poole in England. By melting copper or brass in a shallow cast iron pan, he made pans which were protected from corrosion while the cast iron furnished the required strength. A few years later processes were developed for depositing copper on steel by electroplating, but these processes were limited in their practical application.

About this time wire manufacturing activity began. Steel, copper, and brass were the metals commonly used for wire. However, with the advent of the electrical industry, wires were needed which had high strength, good conductivity, and ha dhigh strength, good conductivity, and non-corrosive properties. Steel wire, while strong, had poor electrical conductivity and corroded very rapidly. Copper did not corrode and was a good conductor, but was limited in strength. Thus the need for a high strength, non-corrosive conductor greatly accelerated efforts to develop a method for the manufacture of copper-covered steel wire. The chronological order of the more meritorious of these activities is of interest.

In the early 1860's, Farmer and Milliken made wire by wrapping copper strips around a steel wire and then tinning the wrapped wire. They made a number of interesting experiments on the electrical and physical characteristics of this wire, but commercially it was a failure. The pioneer patent on a telegraph wire using the casting process to combine these metals was taken out by the same men in 1865. Three years later, a method of casting steel into a copper mold was patented by a man named Park.

IN 1885 Martin, in France, made a composite billet by placing a copper collar on the mid-section of a round steel billet, and then by rolling, spread the copper on the outer surface of the billet. This composite billet could be rolled and drawn into wire by careful handling. It did not make a satisfactory wire material, however. The copper existed as a shell over the steel core, each material retaining its own physical characteristics. Since the two materials were not joined (welded) together but only made variable mechanical contact, electrolysis was set up between the two metals and destruction would follow.

In 1883, a bimetallic wire composed of a steel core with an electroplated copper covering was being considered by one of the telegraph companies. They also tried using a compound wire having a steel core with a thin copper-plated covering surrounded by a wrapping of heavy copper strips. Neither wire had a bond or weld and the character of the copper varied with the conditions of plating. These objections, combined with high production costs, caused this process to be discarded.

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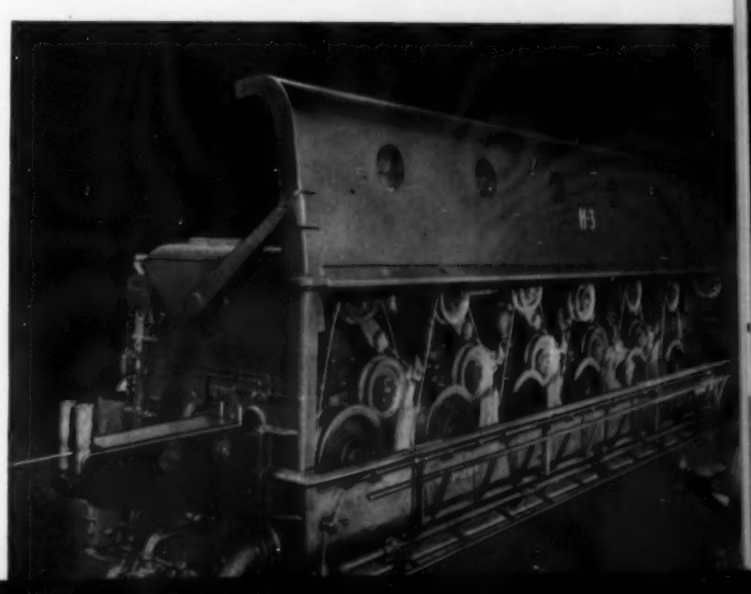

Copperweld wire is cold drawn from 3/8" wire rods on continuous wire drawing material such as this one. Because of the perfection of the molten weld the material "Copperweld", rolls and draws as one metal.

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The SUPERLATIVE in modern telephones

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Basic reliability of performance and high quality of materials throughout — characteristic of previous Monophones — have been retained. In addition, the Type 40 incorporates certain interesting refinements, such as: a choice of two lifting arrangements, recently developed ideas which make carrying easy and convenient; two separate cord holes, to prevent unsightly twisting and kinking; mellow-sounding two-tone ringer, with great carrying power; a choice of "Standard" or "Super-Volume" transmission, the latter for unusually severe operating conditions; decorative chromium receiver and transmitter bands on all models at no extra cost.

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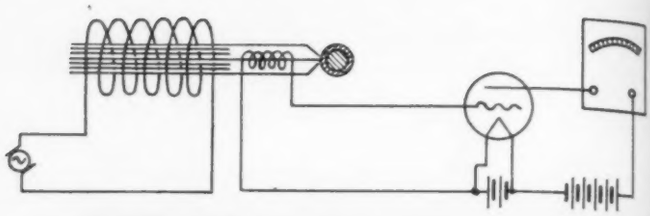
Further attempts were made in the '90's to manufacture bimetallic wire by mechanically forming a copper sheath over a steel wire similar to that of Farmer and Milliken, but were given up as a failure after a year's work.

About 1900, a method of making copper-covered steel by a process similar in principle to the previous Martin's process was again attempted. A thin copper coating was electroplated on a steel billet, after which the billet was inserted in a seamless copper tube. This copper sheathed billet was then heated and rolled with the object of obtaining adhesion between the sheath and the core by means of rolling pressure. Considerable wire was made by this method, but the manufacture was later discontinued.

THE Duplex Metals Company was organized in 1905 and did considerable experimenting on processes of welding copper and steel. Although the company was discontinued after several years, their experiments furnished a key to the problem of the combined use of steel and copper in a wire. Their method, the Monnot process, consisted briefly of dipping an especially prepared steel ingot in a copper bath, this operating wetting the ingot with copper. The ingot in a suitable mold was then placed in a second pot of molten copper and the mold filled, surrounding the steel core with copper to form the composite ingot. After cooling, the composite ingot was withdrawn from the mold and then hot rolled to rod and drawn to wire sizes.

This method secured good union between the steel and the copper. The composite rods or wire possessed the strength and toughness of steel and the electrical and non-corrosive properties of copper. No electrolysis took place between the steel and copper, and when the manufacturing processes were properly carried out, good wire material was produced. The process was quite complicated, however, and the intermediate steps of preparing the material very expensive. Considerable development was still necessary to control and simplify manufacturing operations in order to obtain a uniform product. Although the firm was disbanded in 1912, some of their wire is in use today.



Testing Copperweld wire for minimum copper thickness with special electrical equipment. Diagram illustrates the operation of the electro-magnetic method used.

In 1915, the Copper Clad Steel Company (name later changed to Copperweld Steel Company) began the manufeature of a copper-covered steel known as "Copperweld." Their process, which was less complex than previous methods, was based primarily on obtaining a molten weld between the copper and the steel in the composite ingot. No reliance was placed on rolling pressure as a means of uniting the two metals. Improvements and developments of this molten-welding process at last made possible the production of a wire combining the strength of steel with the life and conductivity of copper.

In this process, the steel billets about 6 inches in diameter and 4 feet in length, is cleaned and fluxed and placed in a cylindrical graphite mold about 8 inches in diameter. The steel, thus prepared and carefully centered in the mold, is placed in a furnace and brought to a white heat. The mold, acting as a muffle, and the flux acting as a protective agent, prevent oxidation of the steel during heating. When the steel has reached a welding temperature, the mold is removed from the furnace and molten electrolytic grade copper is poured into it, entirely surrounding the heated steel billet. Being cast under these conditions, the crystals of copper and steel interlock forming a weld between the two metals. The cast ingot is removed from the mold after cooling and then reheated and rolled to the desired size by methods similar to those used in the manufacture of copper or steel wire rod.

AS mentioned before, no reliance is placed on rolling pressure as a means of uniting the two metals in the production of copper-covered steel

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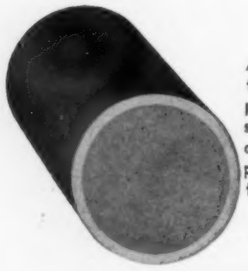
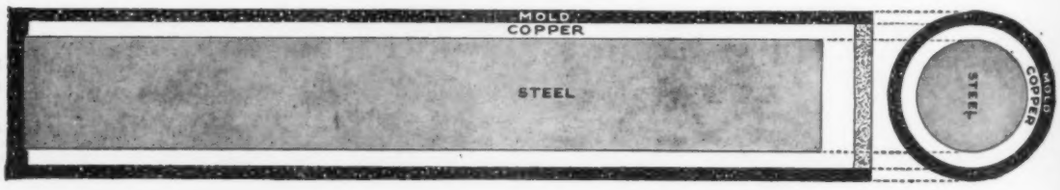


"A"
A section cut through the Copperweld billet showing thick copper exterior permanently molten welded to the steel.



"B"
The large steel billet is centered inside a refractory mold leaving space for molten copper.

THE TELEPHONE EXHIBIT AT THE NEW YORK FAIR

Every day 150 visitors are invited to call their homes or friends in other parts of the country. A person desiring to make a call goes to the application desk (shown above) and is given a card on which he writes the name and number of desired party. If he is lucky his call will be chosen thru a drawing.

Over four and one quarter millions of visitors have visited the telephone exhibit at the New York Fair. This Public Relations effort will prove of inestimable value to operating Independents who are cooperating in demonstration telephone calls.

WE are presenting herewith some of the facts and figures of the telephone exhibit sponsored by the Bell System at the New York World's Fair—1939. This exhibit will react to the value of the Independent telephone industry as the favorable publicity is of great worth to telephone men. Following are the official figures up to and including August 8, 1939:

Total attendance—Bell Telephone Exhibit	4,225,000
Total demonstration long distance telephone calls	15,852
Total no. of people taking Hearing Tests	725,000
Total no. of people who have participated in the Audition Tests	71,000
Total number of people who have listened to Voice Mirror	594,000

The attendance at the building has been quite satisfactory, running from 25 to 33 percent of the total gate each day.

The first ten states to which the majority of demonstration long distances calls have been made are enumerated herewith:

California	2,761
Illinois	1,208
Pennsylvania	1,143
New York	1,069
Massachusetts	940
Ohio	717
Texas	604
Michigan	495
Missouri	396
Connecticut	341

AUDIENCE participation is the keynote of the Bell Exhibit. Visitors will be invited to take part in a series of demonstrations which will include a long distance telephone demonstration—as a part of which the audience may make a number of demonstration long distance telephone calls—a voice mirror that will enable a person to hear himself as others hear him, tests to determine how well the visitor hears words and musical notes, an "amateur show" in which groups of visitors will hear their conversations repeated word for word, and an automatic dial telephone demonstration in which the visitor will be able to dial a number

(Please turn to page 30)

Hundreds "listen in" with head receivers on demonstration long distance telephone calls made from glass enclosed booths (left and right). Operator at switchboard directs path of lights indicating route of call on huge illuminated map directly above. Party in both at left listens while awaiting call. Approximately 150 demonstration long distance calls are made daily.

LINE and DESK

RAY BLAIN, Editor

Q. What is the cable capacity of the average winch drum used on line construction trucks for telephone work?

A. One company states that their large drum has a capacity of 892′ of 7/16″ cable and the small drum 445′ of the same sized cable. The 892′ length will prove adequate for most cable pulling jobs.

Q. What type of telephone is considered the most convenient for installation on steel type office desks?

A. We are of the opinion that the self contained handset type would best meet this requirement. Ordinarily the connecting block is the only attachment which need be made to the steel desk. This would be in locations where the wiring could be run for the line direct to this block and then the cord from the block to the instrument.

Q. In the connection of a small switchboard to the main frame should the cables be attached to an overhead rack or placed under the floor?

A. We would consider either arrangement satisfactory and recommend the use of the one that best meets local conditions. However, if cables are placed under the floor they should be lead covered to provide the necessary protection from possible dampness.

Q. What type of spring bender is considered best for adjusting springs and contacts in switchboard keys?

A. Almost any type of spring bender may be used for this purpose though ordinarily we would recommend the use of duck bill pliers. The points of these pliers should be ground fairly thin in order that they may be placed between the springs of the assembly.

Q. What type of hitch should be used for attaching the pole load of a trailer to the pintle of the truck? Can a chain be used to advantage for this purpose?

A. We are of the opinion that any type of hitch would prove unsuited for this purpose. The best and safest arrangement we know of is the steel drawbar which is clamped to the end of the pole and attached to the pintle of the truck. This drawbar may be purchaseed from almost any telephone supply house.

Q. Will you give us some information on how to make up first aid kits to be carried on our construction and trouble trucks?

A. We suggest that you purchase a filled kit from any large drug supply house. The case itself should be well constructed so as to afford complete protection at all times to the first aid materials against dust, dirt and water.

Q. We are in need of a suitable rack on which to install a new storage battery. Can you give us some advice as to how one should be constructed?

A. Most manufacturers are now in a position to furnish either an all metal or a metal and wood rack on which to install their batteries. These racks will be found more satisfactory than a rack constructed locally and will in most cases likewise prove less expensive.

Q. Is the top or side ladder mount considered most desirable for a light installation or trouble truck?

A. While the side ladder mount is used extensively by some of the larger telephone companies we have never been in favor of it. The side mount as generally used blocks one door of the truck and obstructs the view of the driver to a certain extent. We prefer the top mount as with it longer ladders and other tools such as tree trimmers may be conveniently carried if necessary. Tools carried on this mount are up in the clear where they can do no harm.

Q. We have several defective transmitters and would be pleased to know whether we could purchase replacement parts and effect satisfactory repairs locally?

A. While this might be possible we do not feel free to recommend it. We suggest that you ship the defective transmitters back to their manufacturer and obtain an estimate on the necessary repairs. Satisfactory repair of transmitters generally require special tools not ordinarily available in the average exchange. If your defective transmitters are very old the purchase of the latest type to replace them will probably prove desirable.

Q. We note that some telephone companies are installing lightning protectors on open wire lines several spans from where they connect to the cable. Do you consider this practice necessary?

A. We are of the opinion that local conditions would determine the necessity for this type of protection. Ordinarily we would say that approved type of protection installed at the cable terminal should provide adequate protection for the cable from the open wire lines. However, it is a well known fact that protectors are much cheaper to install and maintain than the more expensive cables when they are damaged by lightning.

Q. We have a length of aerial cable which has several bows in it over its total length. What method would you recommend to remove them?

A. If the bowing is general we would recommend slacking off the messenger as this method is effective and may be accomplished at a low cost. The messenegr must be slacked slowly and special attention paid to all terminal stubs. Before attempting to slack off a messenger all suspension clamps should be loosened and the strand oiled for about ten inches on the side it will slide through the clamp.

Q. Should a telephone line construction truck be equipped with a canvas or metal top to provide the best service under average conditions?

A. This is probably a matter of opinion though we believe that the sliding metal top is more generally used at the present time. In the old days the canvas top was used as it permitted easy removal when the pole derrick was to be raised. The sliding metal top accomplishes the same thing much easier and provides better protection for the truck during inclement weather.

Address Questions to Line & Desk Editor

Ray Blain

Stromberg-Carlson 1212 HANDSET

In designing the No. 1212 Handset, Stromberg-Carlson engineers were faced with the problem of developing parts which were smaller, yet equally efficient to the larger ones which had been in general use. One of these parts was the two-gong, two-toned ringer which is found in every Stromberg-Carlson No. 1212 Handset. The development of this ringer called for a vast amount of experimental work with various magnetic materials, air gaps, windings, shapes and gongs to determine the best combination to give a signal which would be uniform and pleasingly toned, but still attention-compelling on any practical commercial telephone line.

The efficient ringer of the Stromberg-Carlson No. 1212 Handset is another reason why this instrument delights subscribers.

Order a test sample of the Stromberg-Carlson No. 1212 Handset.

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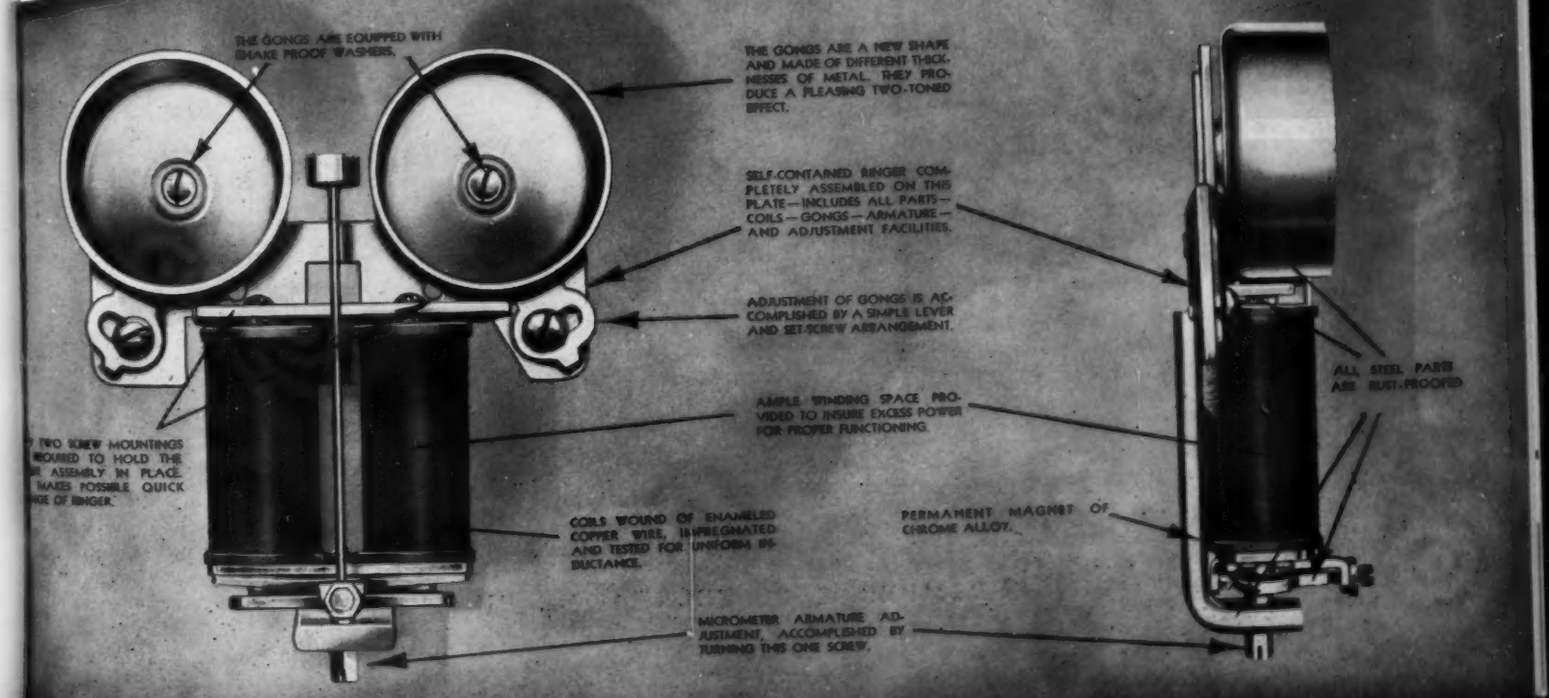
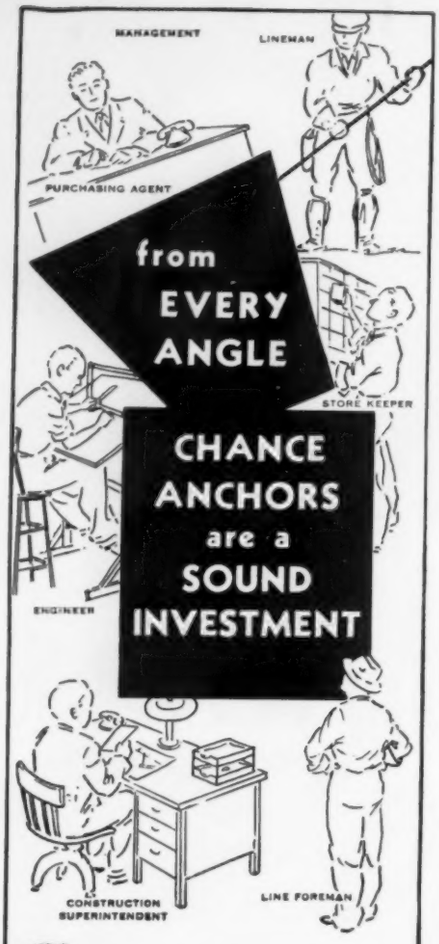

THE GONGS ARE EQUIPPED WITH SHAKE PROOF WASHERS.
THE GONGS ARE A NEW SHAPE AND MADE OF DIFFERENT THICKNESSES OF METAL. THEY PRODUCE A PLEASING TWO-TONED EFFECT.
SELF-CONTAINED RINGER COMPLETELY ASSEMBLED ON THIS PLATE—INCLUDES ALL PARTS—COILS—GONGS—ARMATURE—AND ADJUSTMENT FACILITIES.
ADJUSTMENT OF GONGS IS ACCOMPLISHED BY A SIMPLE LEVER AND SET-SCREW ARRANGEMENT.
AMPLE WINDING SPACE PROVIDED TO INSURE EXCESS POWER FOR PROPER FUNCTIONING.
ALL STEEL PARTS ARE RUST-PROOFED
TWO SCREW MOUNTINGS REQUIRED TO HOLD THE ASSEMBLY IN PLACE. MAKES POSSIBLE QUICK CHANGE OF RINGER.
COILS WOUND OF ENAMELLED COPPER WIRE, IMPREGNATED AND TESTED FOR UNIFORM INDUCTANCE.
PERMANENT MAGNET OF CHROME ALLOY.
MICROMETER ARMATURE ADJUSTMENT, ACCOMPLISHED BY TURNING THIS ONE SCREW.



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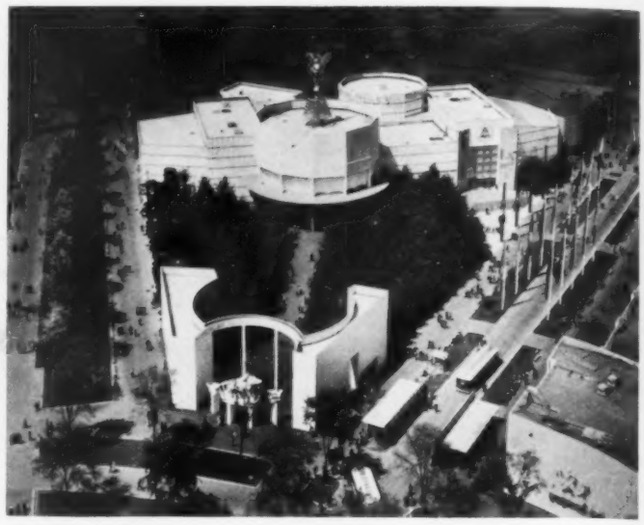
and see exactly what mechanism connects him with the desired party.



This excellent view of the Bell System made from a high point within the Trylon which is located in Theme Plaza. To right is the Avenue of Patriots—left Court of Communications. The statuary group at main entrance depicts the Pony Express.

The Development of Copper Covered Wire

(Continued from page 26)

made by the molten-welding process. Instead, hot rolling the cast ingot serves as a positive and severe test of the weld between copper and steel in every inch of the material. The hot rolling test is designed to test most vigorously both the permanence and continuity of the weld by rolling the material in such a way as to break the copper from the steel if the slightest imperfection of weld exists. Each pass through the rolls subjects the material to an exceptionally severe test, the object being not to bring about the artificial mechanical adhesion of the copper to the steel, but to test the weld, and if possible, separate the metals.

Because the copper covering is permanently and continuously molten welded to the steel core, the wire is free from microscopic cracks, fissures and pin holes that might admit moisture and permit any progress of electrolytic corrosion.

More rigid control, with added refinement in the manufacturing process, has resulted in copper-covered steel rods, wire, and strands of excellent quality and uniformity. Along with the improvements of the wire, tests and inspection practices suited to this type of wire have been developed, such as bend tests, test of weld, kink tests, test for surface, and also means of measuring the copper thickness at any point in a coil without destruction of the wire. Tensile strength, conductivity, minimum copper thickness, and the other physical properties are now controlled by rigid specifications.

IMPROVEMENTS in the art of rolling copper-covered steel ingots and rods developed by the Copperweld Steel Company, now make possible a guarantee of minimum copper thickness on "Copperweld" wire, as well as the earlier guarantee of minimum conductivity. This wire is manufactured in two grades of conductivity. Thirty per cent wire has an electrical conductivity equal to 50% of the conductivity of a solid copper wire of the same diameter, with a minimum copper thickness not less than 10% of the radius of the finished wire; forty per cent conductivity wire has an electrical conductivity not less than 40% of a solid copper wire of the same diameter, with a minimum thickness not less than 12.5% of the radius of the finished wire.

The older methods for measuring copper thickness on copper-covered steel wire required sample specimens cut from the coil of wire, from which the copper covering was removed chemically or mechanically, and microscopic examination made of the end sections of finished wire. These were slow and required laboratory methods for obtaining accurate results. The improved methods avoids the destruction of wire, and may be used to test the thickness of copper at any place in the entire length of the coil. Furthermore, the equipment is rugged and simple and the test rapid. Copper thickness measurements may be made right at the wire testing department along with conductivity and other standard tests.

The improved device for measuring copper thickness makes use of an electro-magnetic method. The layer of copper around the steel is non-magnetic, and therefore, acts the same as an air gap in a magnetic circuit. Consequently,

WANTED

Young man with some experience in plant accounting or general bookkeeping work with Telephone Company to work for company in southern territory. Letter of application should give complete references and experience. Box No. 8239, TELEPHONE ENGINEER.

a magnetic probe placed in contact with the surface of the wire indicates the thickness of the "air gap," or the distance from the surface of the wire to its enclosed steel core, thereby providing a measurement of the wall of copper at that point. The device is rotated around the wire so as to explore the thickness entirely around the steel core. The exact thickness of copper is indicated on a large meter placed in front of the inspector.

The principle of the device is simply that of an electric magnet having a projection extending from its iron core to serve as a probe. The general arrangement shown here is similar in principle to that of an ordinary transformer having a primary and secondary, with loose electro-magnetic coupling between the two. When sixty cycle current flows through the primary circuit, it sets up a magnetic flux in the probe, which in turn excites the secondary winding. The amount of the magnetic flux can be increased by the presence of magnetic material at the end of the probe, thereby increasing the current in the secondary winding. Due to the shape and size of the probe, the increase of this flux can be made to depend mainly upon the distance between the end of the probe and the magnetic specimen, or in other words, upon the thickness of the copper between the end of the probe and the steel core of the wire.

THIS type of equipment has been in service in the plant of the Copperweld Steel Company and has been used for several years for measuring the copper thickness on millions of pounds of wire. It has been tested and checked by the older methods and has been found to be an entirely reliable method of measuring copper thickness on copper covered steel wire. Now, with many refinements of design, these instruments are used to gauge copper thickness on every coil of Copperweld wire.

Two grades (breaking strengths) of "Copperweld" wire, known as "High Strength" and "Extra High Strength" are regularly manufactured. "High Strength" wire has a tensile strength of 120,000 to 140,000 pounds per square inch, while "Extra High Strength"

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- Terminal mounted with cable stub out of either end.
- Service outlets enter through water-tight compression couplings.
- Provides a moisture-proof connection to the underground cable.
- Made in 11 and 16 pair sizes.

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wire has a tensile strength of 160,000 to 180,000 pounds per square inch.

In the telephone field, copper-covered wire is extensively used as "drop wire" for connecting the subscribers' premises to the telephone company's lines; for pole guys and aerial cable messenger, and for telephone line wire. Non-rusting copper-covered ground rods are widely used for the telephone grounds.

Copper-covered wires and strands are also used by electric light and power companies for overhead ground wires (strands) on transmission lines; for pole guys; as messengers for supporting aerial power cables; and for transmission telephone lines. Various combinations of Copperweld and copper wires in the form of 3-wire, 7-wire or 19-wire strands are widely used for power conductors. Also copper-covered steel ground rods in diameters ranging from 3/8 inch to 1 inch and in lengths from 5 to 20 feet are used for driven electrical grounds.

RAILROADS use copper-covered wire and strands for signal rail bonds, to complete the electrical circuit from rail to rail for signal purposes; for pole guys and aerial cable messenger; for overhead ground wire on electric transmission lines, and for signal line wire. Great numbers of ground rods for driven electrical grounds are also used by the signal, telephone, telegraph and electrical departments of railroads.

Copperweld-Copper catenary messenger cable, usually made up of seven copper-covered strength wires surrounded by twelve solid copper conductor wires, has been extensively used as a combination conductor and contact wire support on railroad electrification projects. This catenary messenger cable was used on the recently completed Pennsylvania Railroad electrification between Paoli and Harrisburg, Pennsylvania.

Composite conductors of this same type are frequently used for extremely long spans on transmission lines where these lines cross rivers or valleys. Many such long spans are a mile or more between supporting towers. On two recent lower Mississippi river power line crossings, these conductors were used on 6,000 foot river spans.

Other uses for copper-covered wire include the manufacture of stiff, non-rusting nails and staples, fences that combine the rust resistance of solid copper with the strength of steel, non-rusting anchor rods and special non-rusting wire for many mechanical purposes.

ONE of the most interesting of these mechanical uses for the wire will be found in connection with flood control work done by Army Engineers along the Mississippi River. Articulated (flexible) concrete mats, reinforced, and tied together by Copperweld wire have been laid along the banks of the Mississippi River at many points as a means of preventing bank erosion with resultant destruction of expensive levee works. Copperweld wire was used for reinforcing fabric in these mattresses and Copperweld wire and strand was used for anchoring them in position on the river bank.

Thus, following more than 100 years of development work, and with the aid of modern metallurgical production, and inspection methods, copper-covered steel wires are being producted that at last combine all the desirable characteristics of both copper and steel.

Rate Cut Ordered

The New York Public Service Commission has directed the New York Telephone Co. to reduce rates for hotel, apartment houses and clubs throughout the State.

The order requires the telephone company to establish a schedule of minimum surcharges for messages originating at guest room telephones connected to private branch exchange systems effective September 1.

The maximum rate schedule calls for a 5-cent fee on local calls, 5 cents on toll calls when the charge is 50 cents or less and 10 cents on toll calls when the charge is more than 50 cents.

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Book Review

Dr. Paul Wessel, Physik (in German)
514 Pages, 277 Diagrams
Published by Ernest Reinhardt
Munich, Germany
Price Mark 4.90

Dr. Wessel's "Physics," condensed within some 500 pages, gives a complete account of the present status of physical science. The detailed treatment of the subject occupies over two-thirds of the text supported by numerous examples. The remaining parts consist of a brief recapitulation of the whole subject, a great number of examination questions with answers and an elaborate collection of tables and constants. The text is very well edited, importance of various parts being clearly distinguished by difference in printing. In spite of its condensed form, this book gives an entirely adequate knowledge of physics to anyone requiring it as a secondary subject and can be recommended to college students (particularly of technology) as well as to interested laymen.—*Imre Molnar.*

Rural Phone Users to Hear News Events

Listeners in on rural telephone exchanges at Leonardtown, Great Mills, Nanejemoy and Mechanicsville, Md., these days may think they have tuned in an "information please" program.

Operators on the four exchanges, patrons have been advised in inclosures with their current bills, will furnish:

"The weather forecast, the time and place of public entertainments such as athletic events, school and church festivals, etc.; movies being shown at nearby theaters, operating schedules of school buses, road conditions in their vicinity—and detours."

Officials of the Chesapeake & Potomac Telephone Co. of Baltimore explained that this new service is more or less in the nature of an experiment for rural areas and, if successful, may be adopted elsewhere.

Discontinues Operating Postal Telegraph Facilities

The Lincoln Telephone & Telegraph Company discontinued operation August 1, of the Postal Telegraph and Cable Company's facilities. Cancellation of the operating contract which covered 22 counties in southeast Nebraska was brought about by national legislation and regulation. Under the original contract negotiated in 1933, the Lincoln Company handled every phase of the Postal Telegraph Company's business in its territory.

"Tapping In" on Washington

(Continued from page 16)

on current developments in that field in which the straight line method of depreciation accounting received general approval over other programs for depreciation. The committee report also appeared to sanction the policy of the telephone industry in accumulating a substantial depreciation reserve, regarding such a policy as contributing to the strong financial standing of the companies and to high-grade services and, in the long run, lower rates.

ON the question of competitive bidding for utility securities, a controversial issue which has been brought up recently in the Southern Bell debenture financing and the order of the Pennsylvania commission to compel such procedure in the case of the Pennsylvania Telephone Corporation, the state commissioners' committee took a middle-road attitude and agreed that competitive bidding was not "adaptable to all cases." The presence of commissioner Robert E. Healy of the Securities and Exchange Commission on the committee enhanced the value of the report. The cautious position by this committee appeared to make it clear that the SEC and many important state commissions would not rush headlong into policy of competitive bidding. Incidentally, the recent outcome of the Pennsylvania Commission order in regard to the Pennsylvania Telephone Corp., a subsidiary of the General Telephone System, which resulted in no bids being offered by other underwriters after announcement of competitive bidding, was understood to have aroused further opposition in the regulatory field to this policy.

Census Bureau Issues 1937 Telephone Census

THE evolution of the telephone plant from aerial open wire to cable and comparisons of the place of the Bell System and the Independent telephone industry in the Nation's telephone service in 1937 are depicted in the recent Census Bureau Report on telephones and telegraph.

The Census Bureau cited that the Bell System in 1937 operated 78.8 per cent of the country's telephones while the Independent industry served 21.2 per cent. The Bell System had 89.8% of the wire mileage against 10.2% for the Independent industry, but operated 36.6% of the central offices as compared to 29.5% for the

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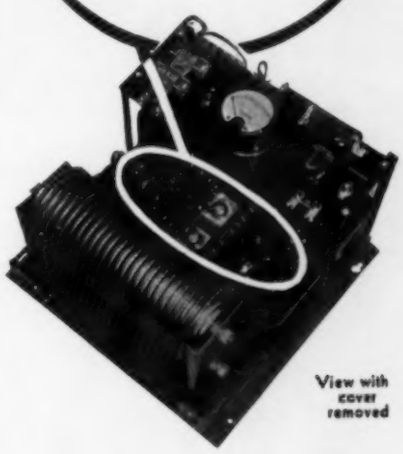

View with cover removed

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larger Independent companies and 33.9% for the smaller Independents. Bell System employees totalled 82.6% as contrasted with 17.4% for the Independent industry. The Bell System reported 82.3% of the originating telephone calls and the larger Independents had 15.7%.

In 1937, the telephone plant was 91.9% in cable and the Bell System had 94.4% in cable while the Independent companies had 69.8% in cable. From 1932 to 1937 the Independent industry increased its cable plant by 12.4%. During the 35 year period from 1902 to 1937, the number of telephones reported by the Bell System showed an increase of 1,064 per cent while the corresponding increase for the Independent telephone systems was 291 per cent. The Census Bureau brought out that in 1902 there was approximately 1 telephone for every 33 persons, while in 1937 there was 1 telephone for every 7 persons.

The following table of statistics for the telephone industry in 1937 was the most important tabulation in the Census Bureau Report in showing the status of the industry:

ITEM	All systems and lines [1]	Bell system	All Other Systems and Lines: Reporting annual incomes of $10,000 or more	All Other Systems and Lines: Reporting annual incomes of less than $10,000 [3]
Number of systems and lines	50,560	26	820	49,714
Miles of single wire, total	90,831,421	81,578,393	7,992,642	1,260,386
In cable	83,457,378	76,995,511	6,382,672	79,195
Not in cable [2]	7,374,043	4,582,882	1,609,970	[2]1,181,191
Central offices, total	12,976	6,945	5,594	6,428
Dial (automatic) system	1,847	1,192	607	48
Other types	17,120	5,753	4,987	6,380
Telephones, total	19,543,401	15,331,983	2,959,201	1,162,217
Served by:				
Dial (automatic) system	8,485,899	7,633,278	847,002	5,619
Other types	10,967,502	7,698,705	2,112,199	[3]1,156,598
Residence	12,377,627	9,292,917	2,032,948	1,051,762
Business	7,075,774	6,039,066	926,253	110,455
Calls originating with systems reporting, total	33,618,333,461	27,666,718,656	5,265,405,353	686,209,452
Local	32,612,715,983	26,840,953,392	5,110,147,260	661,015,331
Toll and long distance	1,005,617,478	825,765,264	154,658,093	25,194,121
Employees:				
At close of June, total	333,162	275,198	44,752	13,212
Male	129,722	107,559	16,905	5,258
Female	203,440	167,639	27,847	7,954
At close of year, total	325,943	268,482	44,416	13,045
Male	128,478	106,689	16,642	5,147
Female	197,465	161,793	27,774	7,898
Salaries and wages	$516,640,009	$463,641,529	$47,053,063	$5,945,417
Total operating revenues [4]	$1,180,028,372	$1,051,379,343	$116,062,252	$12 586,776
Local service [5]	799,501,915	703,443,830	86,043,602	10,014,483
Toll service	350,760,807	321,502,556	26,806,615	2,451,636
Operating taxes	148,605,287	135,917,191	12,087,872	600,224
Investment in plant and equipment	5,001,803,335	4,389,548,887	551,737,125	60,517,232
PERCENT OF TOTAL				
Number of systems and lines	100.0	0.1	1.6	98.3
Miles of single wire, total	100.0	89.8	8.8	1.4
In cable	100.0	92.3	7.6	.1
Not in cable	100.0	62.1	21.9	16.0
Central offices, total	100.0	36.6	29.5	33.9
Dial (automatic) system	100.0	64.5	32.9	2.6
All other types	100.0	33.6	29.1	37.3
Telephones, total	100.0	78.8	15.2	6.0
Served by:				
Dial (automatic) system	100.0	89.9	10.0	.1
Other types	100.0	70.2	19.3	10.5
Residence	100.0	75.1	16.4	8.5
Business	100.0	85.3	13.1	1.6
Calls originating with systems reporting, total	100.0	82.3	15.7	2.0
Local	100.0	82.3	15.7	2.0
Toll and long distance	100.0	82.1	15.4	2.5
Employees:				
At close of June, total	100.0	82.6	13.4	4.0
Male	100.0	82.9	13.0	4.1
Female	100.0	82.4	13.7	3.9
At close of year, total	100.0	82.4	13.6	4.0
Male	100.0	83.0	13.0	4.0
Female	100.0	81.9	14.1	4.0
Salaries and wages	100.0	89.7	9.1	1.2
Total operating revenues	100.0	89.1	9.8	1.1
Local service	100.0	88.0	10.8	1.2
Toll service	100.0	91.7	7.6	.7
Operating taxes	100.0	91.5	8.1	.4
Investment in plant and equipment	100.0	87.8	11.0	1.2

[1] Includes data for connecting lines having fewer than 5 telephones per line, as follows: 11,759 lines; 29,201 telephones; and estimated figures for other items as follows: 44,249 miles of single wire; 27,694 residence telephones; 1,507 business telephones; and $1,599,615 investment in equipment.

[2] Distribution of miles of single wire as between "In cable," and "Not in cable" not called for on schedule used for connecting lines, therefore, all wire for connecting lines treated as "Not in cable."

[3] Distribution of telephones as between those served by dial system and other types not called for on schedule used for connecting lines, therefore, all telephones for connecting lines have been treated as served by other type central offices.

[4] Includes $29,765,650 miscellaneous operating revenues.

[5] Includes $1,078,653 assessments of mutual operating companies; and $704,587 and assessments of connecting lines.

(1) Poles are only one of the hundreds of items which Western Electric supplies.

(2) All materials must pass severe tests. Here an engineer tests a sample of that important little item — rubber tape.

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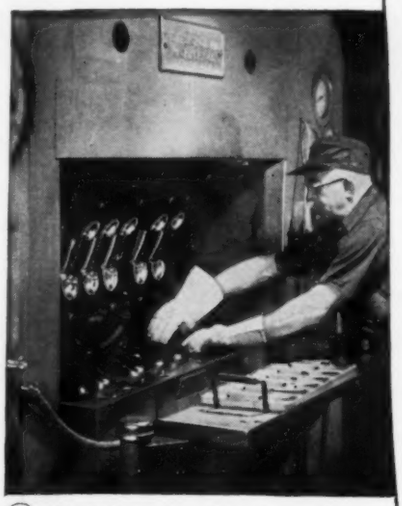

(3) Moulding handles for telephone handsets—one of 248 parts in your Bell telephone.

(4) Each of the three thousand, six hundred thirty-six wires in this cable is given a thorough electrical test.

(5) Twenty-nine distributing houses furnish the Bell Telephone companies with practically everything they require.

(6) And the Company installs the equipment in telephone exchanges.

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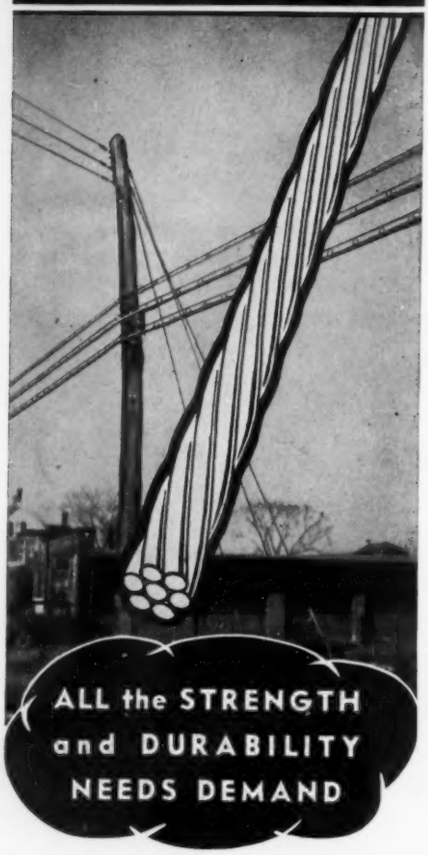

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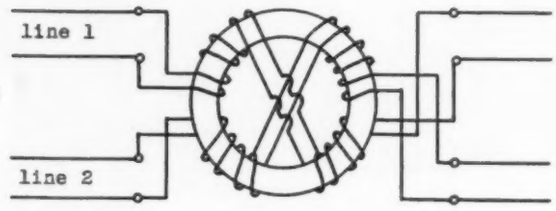
A Short Course in Telephone Transmission

(Continued from page 22)

Figure 7



velocity results in the necessity for echo suppressors on long toll cable circuits.

Load Coil Spacing

The load coils which were formerly used with aerial pole circuits, were placed approximately 8 miles apart Exchange and toll cable circuits spacing is generally either 6000 feet or 9000 feet. The inductance values of load coils ranges from as little as 25 millihenries to 245 millihenries.

In order to keep telephone circuits balanced load coils are wound so that each coil has two windings, each having half of the total inductance. The two windings are connected to each side of the circuit as shown in Fig. 6. This is necessary in order that the side circuit will have the same resistance and inductance value otherwise the circuit balance would be upset and inductive interference and cross talk might result.

Loading coil cores are made in circular form of some type of powered iron or other magnetic material. The modern load coil because of an improvement in magnetic material is considerably smaller than the coils used in the early repeating coils. A number of coils are potted in an iron case and sealed to prevent the entrance of moisture. These cases are placed on the pole line, or buried at the foot of the nearest pole. In the case of an underground cable, the poles are of course placed in manholes. Phantom loading coils have separate windings, connected as shown in Figure 7.

Miscellaneous Feature of Loading Practice

IT should be noticed that loading cannot be successfully applied to short cables to reduce their losses. At least two or more loads are required in a loaded circuit in order to make the desired improvement and this in turn means that the cable must be several miles in length. What has just been said is true of voice frequency loading but does not apply to carrier loading. That is, loading on office entrance cables which carry high frequency carrier circuits. In such cases short spaced loading is often used to improve the cable characteristics so that it will pass the high frequencies without objectionable loss. When load coils are applied to telephone cable, they must be carefully spaced. The coils located near the start or end of the line should be either one half section out or

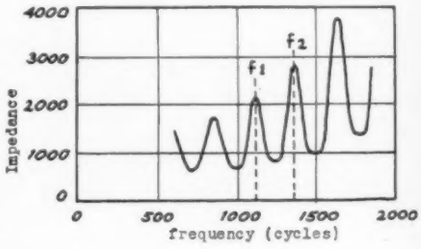


Figure 8

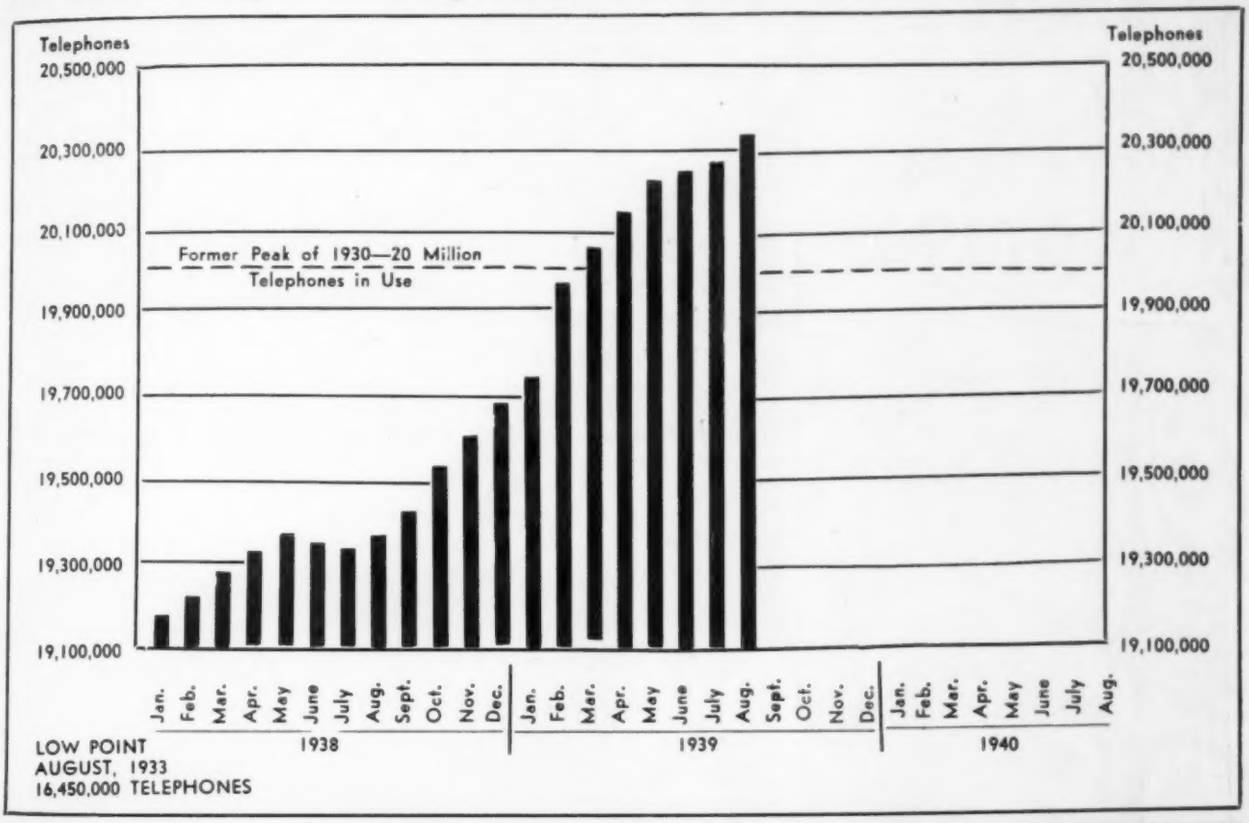
the equivalent effect is obtained by the use of what is termed "building out condensers." These are merely small capacities which are connected to the cable pair in order to build up the capacity to the equivalent of a *half section*. It should be noted that a half section refers to one half the difference between load coils. Load coils which are normally placed on 6000 foot spacing and one half section of this is 300 feet.

(TO BE CONTINUED)

Toll Phone Calls Set New Peak

The traffic forces of the long lines department of the American Telephone & Telegraph Company on Labor Day, 1939, handled the greatest volume of long distance telephone calls in the history of the department. A total of 155,498 calls were recorded at fourteen long distance operating offices of the company located at various points throughout the eastern and middle wes-

Monthly Telephone Station Barometer



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tern sections of the United States.

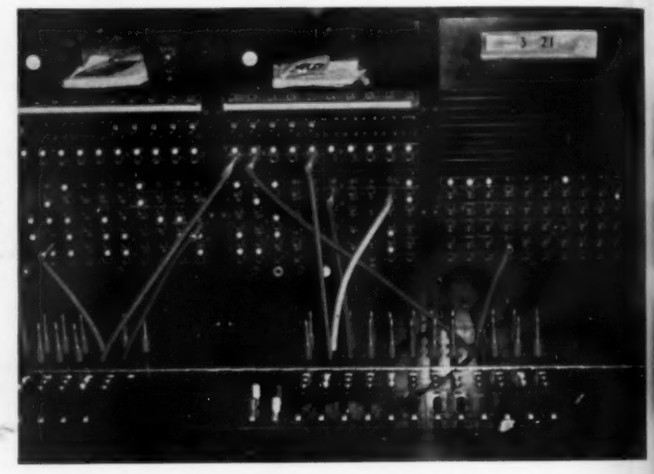
In addition many thousands of conversations passed through the long distance switchboards of the Bell System's associated operating companies.

Tuesday's total was 30 per cent above the normal business day's traffic in August and from 25 to 30 per cent above the normal Tuesday following Labor Day.

Proper Care and Maintenance of Switchboard Cords

(Continued from page 18)

tions of the country where humidity is high and heat excessive. This tarnish forms an insulating film causing the plug to make poor contact with the jack springs so that noise and cutout trouble results.



A safe method on a small switchboard is to replace or repair all cords when the outer braid shows signs of wear.

Numerous methods of plug cleaning are now in general use though no particular method may be considered standard. Any method which cleans well and does not cause injury to the plug may, in our opinion, be considered satisfactory. A fine abrasive cleaner should always be used as there is no need of grinding away the expensive plugs through frequent cleaning. We are all familiar with the fact that in actual service the normal wear on plugs is an expensive problem and there is no need of increasing this item of expense by using an improper cleaning method.

NUMEROUS paste or jewelers rouge cleaners are now on the market and if they are sold by any telephone supply houses or advertised in telephone journals, they may be considered satisfactory. This paste is generally applied with a rag and a clean, dry rag used for polishing. A plain cotton tape may also be used for this purpose. One end of the tape is anchored and the other held in the hand. It is then given one hitch around the plug to be cleaned and pulled back and forth. This cleans well, but care should be observed not to pull the tape too tight or it may unscrew the tip of the plug.

Until a few years ago the finest abrasive obtainable was silica, ground to pass through a screen from 350 to 400 mesh to the inch. Lately, a method has been perfected for grinding this silica so fine that it will pass through a 1000 mesh screen. Naturally, this is entirely too fine for screen gauging, but may be tested by a microscope in a manner similar to that used in taking a blood count. When this fine abrasive is used in a plug paste, there is no danger of it causing injury to expensive switchboard plugs.

A recent development in plug polishing is an especially treated cloth which, it is claimed, does not contain coarse abrasive or corrosive acids of any kind. This cloth is also non-poisonous and is convenient for use in the cleaning of plugs. It is rapid in action in removing tarnish from plugs and from all indications does not cause wear on their surface. Neither does the cloth lose its strength from use as it polishes equally well entirely worn out.

The question is frequently asked as to how often switchboard plugs should be polished. This will depend almost

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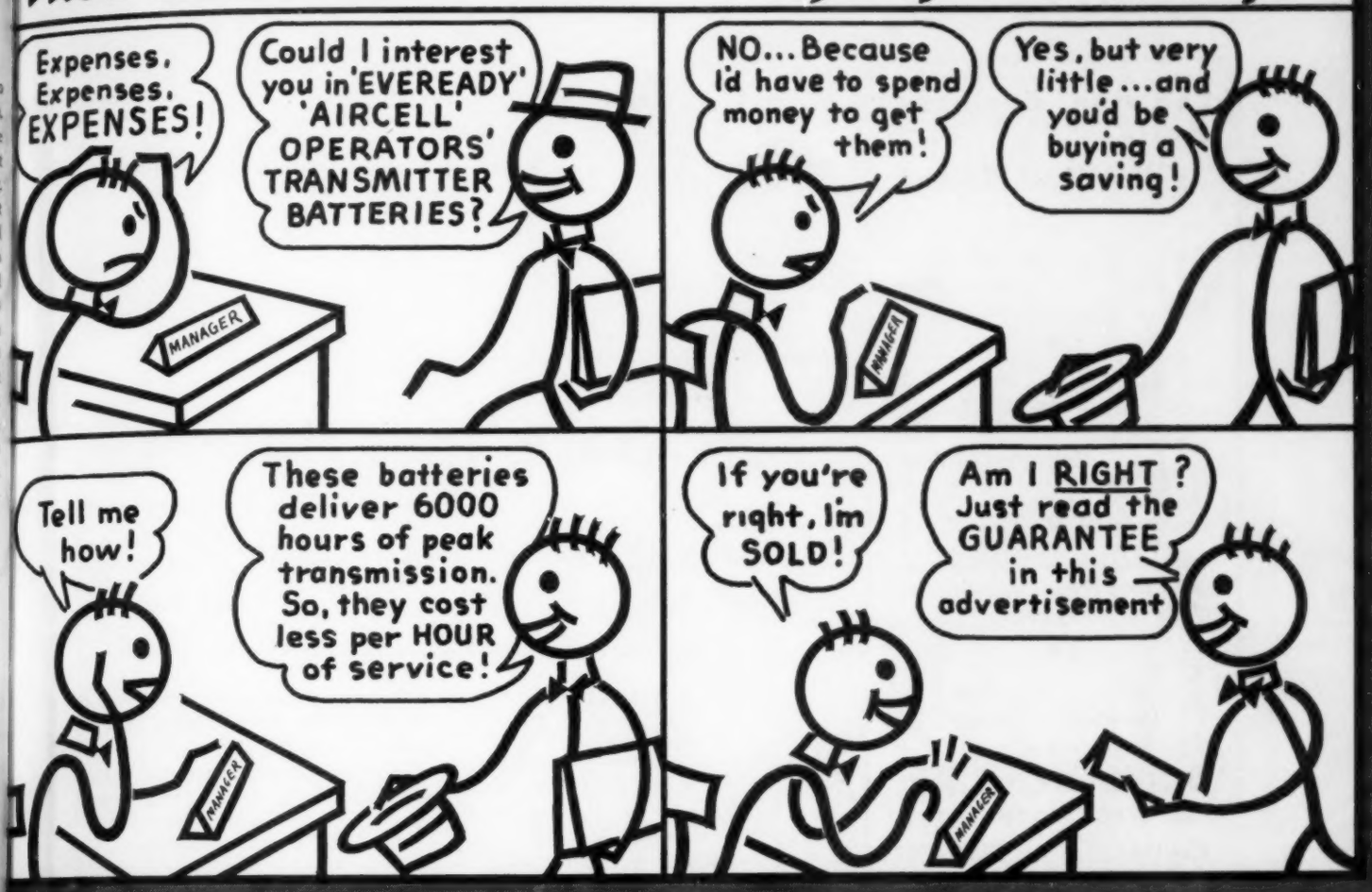
Expenses. Expenses. EXPENSES!
Could I interest you in 'EVEREADY' 'AIRCELL' OPERATORS' TRANSMITTER BATTERIES?
MANAGER
NO... Because I'd have to spend money to get them!
Yes, but very little... and you'd be buying a saving!
MANAGER
Tell me how!
These batteries deliver 6000 hours of peak transmission. So, they cost less per HOUR of service!
MANAGER
If you're right, I'm SOLD!
Am I RIGHT? Just read the GUARANTEE in this advertisement
MANAGER

NATIONAL CARBON COMPANY, INC.

specifically

GUARANTEES

that the "Eveready" "Air Cell" Telephone Operators' Transmitter Batteries, Nos. T-600 and T-300—when used in the telephone service for which they are designed and in connection with transmitters of modern design, and when properly installed and maintained according to directions provided therewith —will deliver a minimum of 6,000 hours of peak transmission efficiency.

NATIONAL CARBON COMPANY, INC.

GENERAL OFFICES: NEW YORK, N. Y. • BRANCHES: CHICAGO • SAN FRANCISCO

UNIT OF UNION CARBIDE AND CARBON CORPORATION

There are
6 REASONS WHY
You Should Use
"EVEREADY"
"AIR CELL" OPERATORS' TRANSMITTER BATTERIES

- ★ ECONOMY
- ★ SUSTAINED VOLTAGE
- ★ COMPACT, NEAT, CLEAN
- ★ 6,000 TALKING HOURS GUARANTEED
- ★ LONG LIFE
- ★ YOU CAN GET THEM QUICK!

"EVEREADY"

TRADE-MARK

"AIR CELL" TELEPHONE OPERATORS' TRANSMITTER BATTERIES

The words "Eveready" and "Air Cell" are trade-marks of National Carbon Co., Inc.

For the Business Office — as well as the Toll Board

●

Dating and timing your mail is as important as any other office practice.

●

For over 25 years Dorson has been making timing devices. The Dorson Time Stamp sells for $17.50 and the Tolltimer for $22.50.

●

Telephone companies have been using time stamps in their front office for many years.

●

Write for Illustrated Literature — TODAY!

DORSON CORP.
605 WASHINGTON BLVD.
CHICAGO ILLINOIS

entirely on local conditions and ordinarily no stated period could be observed. However. ordinarily one cleaning a week in summer and at least one per month in winter would be sufficient in the average exchange. Some small exchanges require that the night operators keep the plugs polished. No doubt, this is often a good idea as it keeps the operator occupied in the light traffic hours of the night. The polishing cloth provides a most convenient means for operators to use as it is clean and may be used between calls.

There is no doubt but that observing the proper care and use of switchboard cords will prove a real saving in any telephone exchange. The ideas advanced here are not intended to be the complete answer for all the problems in connection with this important subject in all exchanges. It is believed, however, that at least a modification of the ideas here proposed if not already in practice may be observed to advantage by any telephone company.

A Safe Investment

Modernizing the rural Exchange Outside Plant is a safe investment which pays well in dividends.

By R. J. HALL

TO the Rural Telephone Exchange manager reference to the subject of investment should point to the very sharp distinction between the expense of maintaining obsolete and deteriorated outside plant equipment serving a rural telephone exchange system on one hand and an investment in the modernization of that same plant by rebuilding from the standpoint of saving.

Suppose for example, an outside plant contains many poles rotted in the ground, pole guys badly rusted or missing, old fashioned log anchors rotted away, decayed pole brackets and cross arms, pins pulled out from cross arms, glass insulators missing, broken or otherwise damaged, line and drop wires rusted to the breaking point, splices improperly made or partly open and etc, all of which perhaps causing considerable trouble and resultant dissatisfaction among subscribers with the service rendered, and in some cases probably resulting in receiving notice to discontinue the service. In addition to this, owing to the generally very bad condition of the outside plant, no new service subscriptions are being received.

● In view of all this would an expenditure of sufficient dollars to prevent these losses, also to improve and increase the quality of service be classified as an expense or an investment.

Without a doubt the Rural Exchange manager does not hesitate when necessary to call in an expert accountant to audit his books. Then, why not call in a consulting telephone plant engineer to analize the present condition of the outside plant equipment and make a report as to the savings which can be obtained in rebuilding the plant by installing modern and more serviceable equipment now. This will go a long way toward putting the entire system in condition for economical maintenance and more efficient operation with greatly added satisfaction to all present telephone users and an appealing service attraction to prospective new subscribers.

THINGS TO REMEMBER

Your Biggest Values in Magneto Handset Telephones Come from Suttle!

Note the Tablephone, Suttlephone, and Crystopac, in No. 50 Catalog.

SUTTLE EQUIPMENT CO.
LAWRENCEVILLE - - - ILLINOIS

LOUIS PITCHER, executive vice president of the U. S. Independent Telephone Association is responsible for this one:

"Madam, you state that you are opposed to capital punishment," said the presiding judge. "But this is merely a case where a wife is suing her husband. She gave him $1,000 to pay for a fur coat and he is alleged to have lost the money playing poker; merely a civil case."

"I'll serve," says the lady, "and maybe I'm wrong about capital punishment."

▼

J. E. Stuart, vice president of the Two States Telephone Company, Texarkana, Texas, let the cat out of the bag in telling about an experience of George Butler, Secretary of the Texas Telephone Association on the occasion of a trip to Chicago; listen:

George ran out of money at a recent conference in Chicago and at the end of a taxi ride he had the hotel charge the fare against his account. Upon checking out later he found an item on his hotel bill which read "POOT $1.50." Forgetting about the taxi ride he curiously inquired of the cashier and found out the charge was "Put Out on Taxi." Stuart vouches for this one.

▼

Big, fat Tom Murray, jovial editor of a Venetian blind publication down in Texas, tells one:

"Have any big men been born in this city?" asks the tenderfoot from Bigtown. "No," says Cactus Pete; "only babies."

▼

W. C. Dillon, of W. C. Dillon, Inc., Chicago, tells us about an incident out in Kansas. Here it is:

"Well, Rastus," says the lawyer, "you want me to defend you, but first, have you any money?" "No, sah, I aint got no money but I got a 1922 Model Fo'd cah." The lawyer thought possibly some money could be raised upon that, so he asked what he was accused of stealing. "A 1922 model Fo'd cah," says Rastus.

▼

Al Thomas, ace salesman for the J. H. Bunnell company, New York, sends this one which he thinks is worth reproducing:

"What was it that Sir Walter Raleigh said when he placed his coat on the muddy road for Queen Elizabeth to walk on," asked the teacher. "Step on it, kid," replied the student.

▼

Our old friend and yours, P. Kerr Higgins, sends us one of his Scot jokes, of which he has many:

A Scotswoman said to her gardner: "Man Tammas, I wonder you don't get married! You've a nice house and all you want is a wife. You know tha first gardner that ever lived had a wife." Tammas replied: "Quite right, but he didna keep his job long."

▼

The following came to us without a signature, taking no chances on his own home town checking up on him. We're passing it on without comment:

A tourist was questioning a darktown inhabitant about the size of his town, and asked how long the interviewed had lived there. "About forty years, and there are about foh thousand people lives here." The tourist amazingly asked "In forty years there has been no increase in population! Haven't any people moved in; any babies been

STANDARD LONG LIFE SYSTEMS LOUD SPEAKING TELEPHONES

Moderately priced filling a definite need in today's business.

Duo-Vox Multiphone **Televox Instantphone**

a system for every application.

Write for information.

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LICENSED UNDER BANK U. S. PATENT NUMBER 1,922,415

. . . no wonder they're so

POPULAR!

WHEN you're perched on a pole, under a sizzling August sun — or working with numb fingers in a biting January blizzard — that's when you'll appreciate the efficency of Vacuum Grip Lineman Pliers. The pliers with a *bulldog grip* and blades that *cut clean*. Pliers that *open at a touch* — that transform light pressure into *tremendous power* — that *make your task easier* under the severest working conditions.

No wonder Vacuum Grip Lineman Pliers are making rapid daily gains in popularity.

And remember, the abnormally long life of these wonder-pliers puts them at the head of the economy class. A tip for Purchasing Agents in *that!* Thrift is vital in these days when every dollar counts.

Ask for prices on lots of six or more and give them an accurately timed running test.

Made by the FORGED STEEL PRODUCTS CO. Newport, Pa. — and made RIGHT!

Vacuum Grip Pliers

OVER A MILLION AND A QUARTER IN USE

LINEMEN:

Order any pair of these pliers. Use them for 30 days. If you are not 100% satisfied with their performance return them and we will refund the purchase price.

PROFESSIONAL LINEMAN PATTERN

Lineman's Favorite
58-R—8½"—$3.25

57-R—7" —$2.50
56-R—6" —$2.00

Lineman's or company name etched FREE on handle of each pair.

WHY KLEINS?

No. 201 N. E. Klein Side Cutting Plier. "Streamlined" for use in confined spaces.

Good workmen demand good tools. In the hands of men who know — everywhere — the pliers are invariably Kleins. Only the keen, hand-honed, perfectly matched cutting knives of Klein Pliers — only the comfortable spring grip in the Klein handles — only the general all around quality that is an inherent part of every Klein Plier can satisfy men whose work demands the best in tools. This, perhaps, explains why Klein Pliers are the standard of quality by which others are judged — why the name Klein has stood for maximum quality, "since 1857."

DISTRIBUTED THROUGH JOBBERS

Foreign Distributor: International Standard Electric Corp., New York

The four pamphlets listed below will be sent without charge to anyone interested. Check the ones you want:

- ☐ Safety for the Pole Climber.
- ☐ Specifications on Linemen's Belts and Safety Straps.
- ☐ The Safety Factor on Linemen's Leather Goods.
- ☐ Pocket Tool Guide.

Mathias KLEIN & Sons Chicago, Ill. U.S.A.

3200 BELMONT AVENUE

born." To which the colored inhabitant replied, "Yes sah, babies been bo'n, but every time a baby is bo'n somebody leaves town."

▼

T. P. Bearden of Baird, Texas, seldom tells a story, but he did rake up this one for Phunny Editor:

Drug Clerk:—"Just step into the booth and tell the operator whom you want." Caller:—"I did—but there is no operator in there."

▼

'Way last year J. H. Agee, vice president and general manager of the Lincoln Telephone and Telegraph Company, Lincoln, Neb., sent us the following, but it has been stored in our files along with many others all these months. But it is still good:

"Some wit has said that marriage often results the same as the use of the telephone; that is, sometimes you get the wrong party. About three A. M. the night of the last national election, I was aroused by my telephone ringing. The operator apologetically explained that they were unable to satisfy an irate subscriber who insisted upon talking to the General Manager. I said, "All right, put him up." The following conversation took place.

"Ish thish the scheneral manasher of this damn telephone company?" I acknowledged the personal responsibility. "Well, I want you to fire thish operator." I said, "What is the trouble?" "She won't put up a long dishtance call for me. I want you to know I pay my bills and I demand shervice." I explained that we of course wanted to provide service. "Tell me the whole story," I said. "Well," he said, "I put in a long distance call and thish operator won't acshept it." I asked, "Why won't she accept it?" He replied, "She shays she can't and I want her fired." "Well," I said, "whom are you trying to get?" He said, "I want to call President Roosevelt and say 'Hooray!'"

Naturally, the operator was not discharged.

▼

Along about the same time comes a letter from J. N. Cox, president Southern Continental Telephone Company, Cookville, Tenn., and tells about an incident at a recent state fair; listen:

During the Dallas Fair the Management was very much interested in procuring a sure-enough pedigreed Indian Chief and his Squaw to add to their free attractions, so they sent a scout to Oklahoma to find a pair that would fill the bill. After diligent search they succeeded in finding an Indian Chief that was a descendant of Chief Gorinomo or some other renowned of the Indian tribe and his Squaw was typical of the old days. After considerable persuasion and an attractive offer he loaded them on the pullman and started back to Dallas. These Indians had never been on a train much less a pullman and they were provided with a section, the drawing room not being available. The Chief as was characteristic took the lower berth and put his squaw in the upper. Soon after retiring he knocked on the berth above and announced that "Big Chief wants drink." She climbed down out of the berth and went back and brought him a drink. She had not much more than gotten back in the berth and half asleep when he called again and she made the second and third trips. Finally a little later he announced that "Big Chief wants more water" and back she went and stayed and stayed, and the Chief become very much exasperated and when she did return he said "Why don't you bring Big Chief more water?" She said, "Indian Squaw can't bring Big Chief any more water, White Squaw sitting on well."

Toll Rate Cut Ordered by Commission

The New York Public Service Commission on July 14 ordered the State's six largest telephone companies to revise toll rate schedules on certain distances by August 1.

The commission's order increases the initial calling period from three to four minutes for distances from 28 to 40 miles, and reduces the overtime charge from 10c to 5c per minute for calls between 28 and 34 miles.

The order is directed against the New York Telephone Co., Rochester Telephone Corporation, Orange County Telephone Co., Upstate Telephone Corporation of New York, Jamestown Telephone Corporation and Chenango & Unadilla Telephone Corporation.

Resumes Phone Service After 18 Years

If you want to call any of your friends in Dawson County, Georgia, tonight, go right ahead, because telephone service has been resumed there after a lapse of 18 years.

It may take some time to get your call through, however, as the county still has only one telephone and it will be necessary to send a messenger for your friend—unless he is Silvey Harben, owner of the filling station where the phone was installed.

Dawsonville, (Ga.) population 203, is the seat of Dawson County, population 3502, and is 100 miles north of Atlanta. The county seat had a telephone in a hotel until 18 years ago, when a fire swept the town.

Direct Service to Italy

The American Telephone and Telegraph company established direct radiotelephone service to Italy Sept. 11. Direct service to the Netherlands will begin today. Plans are under way to extend the service by wire from these countries to other lands in central and southeastern Europe in which trans-Atlantic telephone connections have been disrupted by the war. The rate from Chicago to Italy is $26.25 for three minutes, with a reduction to $19.50 after 5 p. m. and on Sundays.

Direct Line Germany to Greece

The direct telephone line recently opened to public service between Berlin and Athens is about 1900 miles long. The circuit is in underground cable from Berlin to the frontier town of Wildon and from there it continues on an overhead open wire line across Jugoslavia to Athens. Carrier frequency apparatus, furnished by Siemens and Halske, provides several simultaneous communication channels.

Canadian Survey Reveals Phone Figures

There are more radio sets than telephones in the homes of Canadian families in the low income group, a survey by the Dominion Bureau of Statistics reveals.

Appreciable differences were noted among wage earner families in relation to the amount of household facilities and equipment at their disposal. Eighty-six percent of the families of British origin, who owned homes, also possessed radios; of the same families only 49 per cent had telephones. Among tenants, this type of equipment was less common, 82 per cent having radios, and 36 per cent telephones. Tenant households, however, appeared more completely equipped with general plumbing facilities such as kitchen sinks, bathtubs, inside running water, etc.

$3,000,000 Laboratory Authorized

Construction of a new $3,000,000 laboratory building by Bell Telephone laboratories was authorized by the company's board of directors recently, the building, which will be constructed on property now owned by the company at Murray Hill, N. J., is scheduled to be ready for occupancy by 1941. It will house 800 persons. The new unit will provide space for certain groups in the research and apparatus development departments. It also will contain laboratories for physical research, chemical research, outside plant development and material standards. The Murray Hill property is located in the township and borough of New Providence, N. J., southwest of Summit, N. J.,

I. T. & T. Names New Export Manager

O. J. Olgiati has been appointed export manager of International Telephone & Telegraph Corp., it was announced on Aug. 11. Mr. Olgiati has been in the telephone business since 1911 and in the sales end for the last 17 years.

P. M. Ferguson, Jr., Made Automatic Sales Representative

Mr. P. M. Ferguson, Jr., of the Chicago Sales organization of American Automatic Electric Sales Company, has been appointed as this company's sales representative in part of Minnesota and in North and South Dakota, with headquarters at Alexandria, Minnesota. Mr. Ferguson is a native Minnesotan and brings to his work a thorough knowledge of telephone matters.

Mr. W. E. Huntley, who has been sales representative for this company in Minnesota and South Dakota, will in

FOR QUICKER EASIER TRIMMING WORK
use SEYMOUR SMITH TOOLS...
TREE TRIMMERS
POLE SAWS
BRUSH CUTTERS
CABLE CUTTERS
JOINTED TEST-PIKE POLES
A line of tools designed for linemen's use that are standard equipment with the world's largest Utility Companies.
Send for folder and prices of this labor saving equipment.
SEYMOUR SMITH & SON, Inc.
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POLE LINE MATERIAL
A good specification - always!
OLIVER WESTERN UNION PINS MADE TO THE MOST EXACTING SPECIFICATIONS . . . . . .
Oliver Western Union Pins are forged from high carbon, open hearth steel and are equipped with the best grade of oak cobs which have been thoroughly boiled in paraffine to exclude all moisture. Available in long shank, short shank and lag screw type.
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OLIVER POLE LINE MATERIALS
APPROVED AND ACCEPTED SINCE 1894
OLIVER

The Clearing House

For the convenience of readers of Telephone Engineer

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TELEPHONE DIRECTORY ADVERTISING
A SALES ORGANIZATION
Exclusively....
That Has Never Failed to Produce More Net Revenue for Telephone Companies Served, All Costs Considered.
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Telephone Engineering — Construction Supervision — Appraisals — Financial — Rate Investigations
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J. G. WRAY & CO.
Telephone Engineers
Specialists in Appraisals, Rate Surveys, Financial Investigations, Organization and Operation of Telephone Companies
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CHICAGO

CLASSIFIED

POSITION WANTED: As combination man or lineman with independent company, by young man of good character, single, with no encumbrance, 8 years experience with magneto and central battery systems with Bell Company; also have line construction experience, can furnish good reference, not afraid of work, available immediately, location immaterial. Box 8233. TELEPHONE ENGINEER.

the future handle sales in Eastern Minnesota and Western Wisconsin with headquarters at St. Paul, as at present.

E. D. Talbot Continues Consulting Practice

After spending several months in Brazil looking over South American telephone properties, Emmet D. Talbot, formerly with John C. Larkin & Co., has returned to the United States and will continue his practice as consulting telephone engineer. He is now situated at 129 Milford Drive East, Syracuse, New York.

New Recording Machine introduced by Gray

The Gray Manufacturing Company, Hartford, Connecticut, manufacturers of telephone pay stations, has announced a recording machine designed to overcome high operating costs. Employing an entirely new principle of recording, this machine, intended primarily for office use is all electric; takes dictation, either at hand or remotely; makes a complete record of conferences and meetings, and records both sides of a telephone conversation. It is approximately the size of a standard typewriter; weighs about twenty pounds, and records on inexpensive, paper-thin, acetate discs that may be mailed or filed like letters. A twelve inch record provides over sixteen minutes of playing time.

WORK WANTED—in small exchange by man 56 years old. Good habits. In telephone work since 1898. Unemployed since September. Can furnish best of service records and references. Box 8236.

POSITION WANTED—Young man, 28, with 8 years experience in all departments telephone work. Have done cable, live construction, plant, accounting including depreciation study. Will go anywhere. Speak Spanish. Excellent references. Reason for unemployment, retrenchment on seniority basis. Address—J. O. Whalen, Carlisle, Indiana.

Telephone Directories

Telephone Directory
ADVERTISING
Write or telephone for proposition
L. M. BERRY & CO.
Call L D 16 Telephone Bldg. Dayton O.

Poles

Carney
CEDAR POLES
Plain or Butt Treated
B. J. CARNEY & CO.
100 No. 7th St. Minneapolis

Finished Cedar Poles
VALENTINE CLARK CORPORATION
St. Paul, Minn.

CLASSIFIED

FOR SALE: Independent telephone company, local and long distance, of 500 odd stations, situated in valley principally agricultural with growing rural manufacturing. Plant and system in excellent condition. Minimum of maintenance necessary. Box 801-S TELEPHONE ENGINEER.

WANTED: Installers capable of supervising and/or installing all kinds of automatic and manual central office equipment. Must be willing to travel. In reply state age, experience, education, nationality, number and age of dependents, salary expected, present location, past employers, and type of equipment you have installed. Write Box No. 8238.

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For the convenience of readers of Telephone Engineer

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HARMONIC
PUSH BUTTON
INDIVIDUAL

KELLOGG - WESTERN
S. C. CO. - A. E. CO.
LEICH - MONARCH
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Escutcheons as specified.

Buckeye Telephone & Supply Company
COLUMBUS, OHIO

RECONSTRUCTED EQUIPMENT

Western Elec. No. 20 desk sets with No. 315 3-bar 1000-1600 ohm 2500 ohm ringer inside connection signal set $10.00—4-bar $10.75—5-bar @ $11.50

Western Elec. No. 46 Central Battery Ind. Coils @ ..... .50

Western Elec. No. 20 Central Battery Ind. Coils @ ..... .35

Stromberg Carlson No. 1179 All Bakelite Hand set with 3-bar 1000-1600 or 2500 ohm ringer inside connection signal set $14.25—4-bar $14.50—5-bar 15.50

Kellogg No. 115 Desk type Grabaphones with 3 Cond. cord wired for use with any standard 3 Cond. connection signal set @ 4.50

Kellogg No. 115 Grabaphone with 3-bar 1000-1600 or 2500 ohm ringer signal set $10.00—4-bar $10.50—5-bar @ 11.50

Gray No. 11 3 slot wall type paystations for 5 lo and 25c coins @ 6.50

Western Elec. No. 38 latest type 2500 ohm ringers with 3 inch gongs @ 2.25

Telering ringing machine operates off 110 Volts A. C. Light Ckt. @ 20.00

Stromberg Carlson, Leich or Monarch Local Battery Transmitters with back and new mouthpieces @ ..... .90

Kellogg 8 line cordless P. B. X. board equipped with 8 local line visual signal and two ring down trunks, complete with desk set Opr. set @ 60.00

Western Elec. No. 21D. 2 M. F. Condensers @ ..... .35

Stromberg Carlson No. 896 3-bar 1000-1600 or 2500 ohm ringer compacts $8.75—4-bar $9.25—5-bar @ 9.75

REBUILT ELECTRIC EQUIPMENT CO.
Not Inc.
1934 WEST 21ST ST., PILSEN STATION
CHICAGO, ILL.

Joins Advertising Network

C. Franklin Brown & Co., Advertising Agency at 75 East Wacker Drive, Chicago, well known for its work in the telephone equipment and general industrial fields, has joined the National Advertising Agency Network as its Chicago member. The Network is an organization of more than a score of independent advertising agencies located in key marketing centers throughout the United States, each agency furnishing "branch office" facilities for the others in the Network.

New Telephone Ranging Rod

A new telephone ranging rod pictured herewith is now being manufactured by Seymour Smith & Son, Oakville, Conn. It is 8' in length, demounts in two 4-foot sections for convenient transportation, quickly assembled or taken apart, colored for clear visibility and of featherweight construction.

This ranging rod is perfectly suited for all surveying work. All brass joints are securely riveted to pole. When the 2 sections are joined they are firmly locked in place by means of a spring catch and locking pin, making it extremely light but very strong.

Complete information is available with data by addressing the company or the editor of this publication.

Telephone Pioneers

The Independent Pioneer Telephone Association yearly roster will go to press September 10th. If application for membership is received on or before that date your name will appear in the book.

All new members will receive a membership certificate, service badge, $1,000 accident insurance policy, The Story of Independent Telephony (a $3.00 book).

Send today for application blank.

J. K. Johnston, Secretary
632 Lemcke Building,
Indianapolis, Ind.

Specialists in Rebuilding and Repairing

TRANSMITTERS

Western Electric grounded transmitters rebuilt and made metallic ..... @$ .80

Metallic type of transmitters complete, rebuilt, each ..... .50

Auto-Elec. No. 21 Off-center Desk Stands arranged for but less dials @ ..... $ 4.50

Auto-Elec. No. 21 Enclosed Gong Straight Line Ringer Boxes @ ..... $ 4.50

SPECIAL

Reliable 200-line Main Frame, with fuses, carbons and distributing blocks $80.00

Handyman Pole Lifting and Straightening Jacks — complete with chain, steel pike pole and steel base plate. A very strong light-weight jack, easily handled by one man. (Will do the work of 5 men with bars and pike poles) $15.00

Kellogg and Stromberg - Carlson Rebuilt Desk Stand and 5 Bar 1600 Ringer Box. (Like new) $12.00

W. E. No. 143 Receivers (with new cords) ..... $ 1.25

Chicago Telephone Supply Co. 5 Bar Generators ..... $ 2.50

W. E. No. 1800 Magneto Switchboard—20 lines—6 pairs of Cords $80.00

Paragon Metal Battery Boxes (3 Cell) Like New ..... .60

Telephone Repair Co.
Daniel H. McNulty, Manager
Rogers Park Station Chicago

REBUILT EQUIPMENT

Western Electric Desk Sets, 1000 ohm, No. 315 ringer box, No. 20-AL, stands, complete with new cords, Per set, @ $10.00

Western Electric 317 Wall Phones, 1000-1600-2500 ohm ringers, slanted shelfs, short arms, 4 bar Stromberg generator, complete set, @ $8.50. 5 bar gen. @ $ 9.00

Kellogg Desk Sets, 3 bar 1000 ohm, New cabinets, No. 84 stands, new cords, per set ..... $ 9.50

Western Electric Condensers, No. 21 type, D. E. F. AP, each ..... .35

Western Electric Common Battery Desk & Wall Sets, 1000 ohm, enclosed gong type. Per set ..... $ 8.00

Independent Telephone Repair Co.
1432 W. 15th Street
CHICAGO, ILL.

WANT TO BUY

a telephone exchange of not less than 500 stations. Must be in the South. Texas preferred. Would consider several exchanges if grouped in same vicinity. All offerings will be treated as confidential. Answer Box 8237.

IMPROVED
RARE GAS ARRESTERS

Avoid interruptions to service and provide full protection. Keep your lines clear and reduce maintenance expense. Interchangeable with other types.

New Vincent
RARE GAS
RELAYS

On rural party lines cuts out inductive interference, improves transmission; used with either coded or harmonic bells. EASY to install.

TEST-O-LITE

Handiest electrical tester made; Neon light quickly tells where trouble lies in electric circuits, fuses, cut-outs, motors, radios, appliances, etc. 1,001 uses for electricians. Tests any voltage 110 to 550; tells A.C. from D.C. Fountain-pen size; with pocket clip. Lifetime guarantee.

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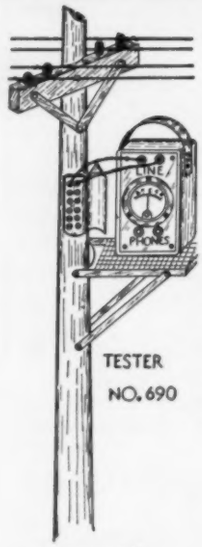
NEWARK, N. J. - Estab. 1906
Oldest Makers of Rare Gas Devices



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made easy
SHALLCROSS
Tone Generators
Decibel Meters
will
enable you to maintain high quality transmission on all your lines and equipment.

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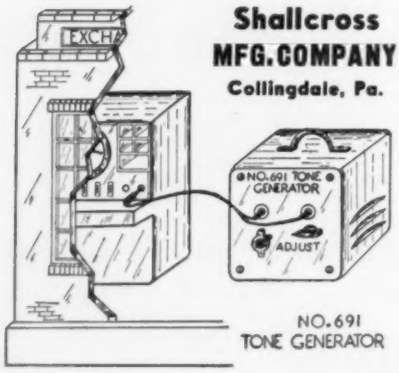

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MFG. COMPANY
Collingdale, Pa.

NO. 691
TONE GENERATOR

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